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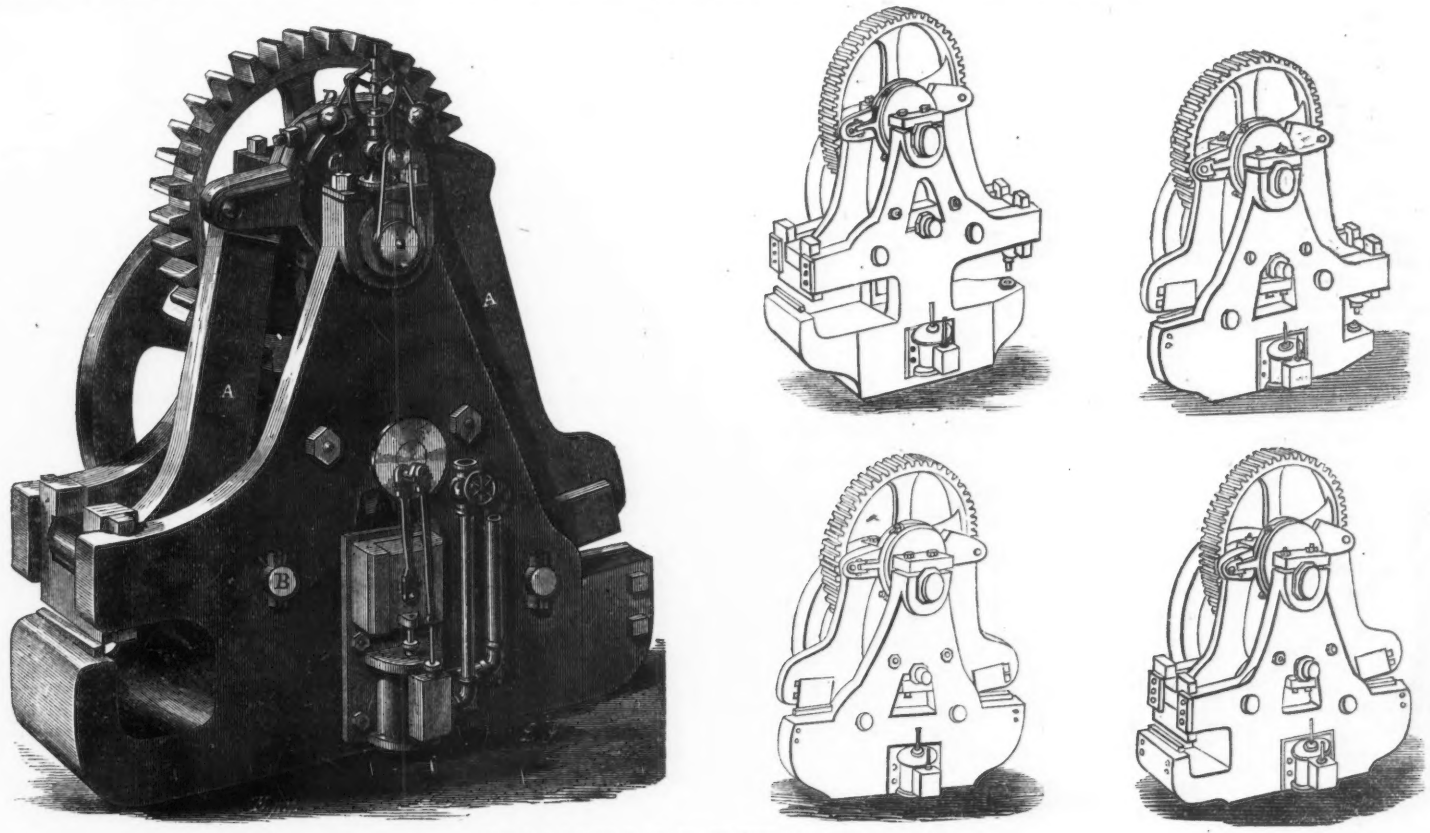
Iron Shears and Punching Machines.

PROBABLY no other machines in a well arranged machine shop attract so much attention from visitors as those of this class. The immense power which is gained in these machines by diminishing the speed, is indeed a marvel to the uninitiated; and a machine that cuts or punches iron with apparently the same ease that we can cut a piece of paper with an ordinary pair of scissors, is indeed a proof of human ingenuity that we may well admire.

The first point which is calculated to attract attention in the machines represented in our engravings, is their massiveness and strength. It will also be noticed that the machine is provided with a small steam-engine of its own. Most of the machines now in use employ this engine as a motor; but if situated near shafting which works other machinery, the engine may be removed, a pulley attached to the pinion shaft,



IRON SHEARS AND PUNCHING MACHINES.

and the machine run by a belt. The action of the machine is exceedingly simple, as may be seen from a glance at the engraving. By means of a small cog-wheel, the motion of the pinion-shaft is conveyed to the large wheel D, and the speed thus diminished and the power correspondingly increased. Attached to the same shaft is the eccentric C, which operates the lever arms A A. In the large cut, the lever on the left is represented as arranged for cutting plates by means of a perpendicular motion given to the slide block. The levers are purposely made the weakest part of the machine in proportion to the work to be performed; so that they will be the first to break, in case of an undue strain. In that event, a lever can be replaced with but little expense and delay, and the remaining lever kept in operation except for the short time necessary to remove the broken one. Three sizes of these machines are manufactured by PAULDING & KEMBLE, at the West Point foundry, Cold Spring, New York. The manner in which they are arranged for the plate-cutting, bar-cutting or punching, is clearly shown in the small cuts. It will be noticed that they are very compact, and afford plenty of room for the workmen to arrange their work to the best advantage.

On Improved Appliances for the Production of Heavy Forgings.*

By Lieut-Colonel CLAY, of the Birkenhead Forge.

THE forging of iron in large masses is a subject of so much importance to our engineering industry that it needs little apology for its introduction to the Mechanical Section of the British Association, and any improvement in the machinery or appliances for the more economical or rapid manufacture of large masses of wrought-iron, or for any improvement in quality, must be of great interest to all manufacturers where such products are needed. These improvements in the manufacture of large forgings I intend to class under three heads. I propose simply to mention a few prominent facts very briefly, but shall be glad to answer any inquiries that members may require further information about.—1. Improved heating by Siemens' regenerative gas furnace.—2. Facilities for handling and moving large masses of wrought-iron from the furnace to the hammer, and for moving them under the hammer.—3. Improved hammers, with a clean, unfettered fall, and with such width of standards as to give the workman all the comfort and convenience possible in executing the necessary operations of shaping, forging, and cutting the material to the required form.

1st.—Improved heating by Siemens' regenerative gas-furnace. It is generally admitted that iron in large masses is greatly deteriorated by long exposure to high temperatures, and that a crystalline structure is developed in consequence of such a form and nature as to detract in a very great degree from the strength of the material. It must, therefore, be admitted that furnaces such as those of Siemens', which produce the most intense heat in the shortest possible time, must cause less deterioration to the product in hand than those which are slower in operation; but a more important item in this consideration is that by the facilities given for regulating the admission of gas and air in a neutral flame can be produced, and, in consequence, the iron may be preserved from that burning and oxidation which is the cause of the formation of those large facets or crystals which weaken many wrought-iron structures of large size to such an immense extent. Another improvement from these furnaces where the iron is prepared from the pig, is that the gas-furnaces do not bring over the large amounts of unconsumed ash or *debris* from the coal which is usually deposited on the body of the iron made in the ordinary puddling-furnace, and, in consequence, the iron is more free from those specks and flaws which are so observable in ordinary iron, and which produce the heating and galling so common in large forgings, as heretofore made, and which cause the chief torment of the practical marine engineer. Perhaps the greatest advantage which the Siemens' furnace offers in the manufacture of forgings of puddled steel, from the facility in which the flame of the furnace may be regulated—first, in the puddling process, and, secondly, in the heating of the puddled steel masses. In furnaces of ordinary construction a constant deterioration of the puddled steel must necessarily take place from the free oxygen present in the furnace; but in the Siemens' furnace the gases may be so regulated that a neutral flame is produced, and, consequently, the steel mass is heated without deterioration. I will not now enter into the question of economy of fuel, as this has been often discussed at meetings of mechanical engineers; nor will it be necessary to enlarge upon the great advantage, especially in large towns, of the absence of smoke, which has been hitherto thought a necessary nuisance in all branches of the iron manufacture.

The second improvement which I would wish to mention is improved facilities for handling and moving these large masses of iron when heated as above described, which is effected by hydraulic cranes and machinery of sufficient power to move these large masses almost instantaneously, either from the furnace to the hammer or, *vice versa*, to raise and lower the load, or to increase or decrease the distance of the load from the centre of the crane.

The truth of the old adage, of striking when the iron is hot, will prevent any necessity of dwelling upon the advantage of rapidity of movement in dealing with large heated masses of iron. After the pieces of iron have been heated in the manner described, and when the machinery shown has brought the forging to the hammer, it is necessary that that instrument should be of the most approved description to cope with the material under operation in the best and quickest manner, and with the greatest possible comfort to the workman employed at the work designated. Hammers that are described as suspended are employed; they are carried upon wrought-iron girders, of twenty feet span, which gives the hammerman such room for his operation and such freedom from any obstacle to his work as has seldom, if ever, been accorded before, and so much room to the rear is reserved that shafts fifty or sixty feet long could readily be made without any inconvenience.

* Read before the British Association for the Advancement of Science.

Department of Docks—Excursion by the Commissioners.

THE Commissioners of the Dock Department, on the invitation of Captain HUGH MCKAY, recently made an excursion in the steam-yacht "Vormland," about the waters of the harbor, with the especial design of showing the difference in the height of the tides flowing through the Hudson and East rivers, and of proving the impracticability of any plan that proposed throwing barriers or piers across the East river, making a gigantic inclosed dock. Commissioners AGNEW, WOOD, HUNT and HENRY, Mr. PETER COOPER, guest, and Captain MCKAY, commander, made up the party. The yacht's course was directed down the river, around the Battery, through the East river, Hell Gate, the intricacies of the channels leading to Long Island Sound, and finally at Stepping-stone Buoy, off

Hewlett's Point, rounding a stake-boat for a homeward course. The Commissioners occupied their time in observing closely the condition of the docks; inspecting here a neat pier that had been built under their supervision, here another, the rotting timbers of which told of a careless owner and a reckless lease by the city. The evidence of a new order commenced by the Department was visible along the entire river front, in the repairs and patches made in countless piers, and in the swarms of workmen constructing and repairing others. Passing Blackwell's Island, Mr. COOPER remarked, pointing toward the Blackwell homestead, "Ah! I remember how, some forty years ago, I walked up to that door, and there on that porch talked with old Mr. BLACKWELL, and negotiated with him the sale of the Island to the Common Council for $40,000. It couldn't be bought now for $10,000,000."

Captain MCKAY alluded to the flow of the tide, and said that, in his opinion, no system of river front improvement should be considered independent of its ebb and flow. If a dam was thrown across any part of the East river, it would have the effect of raising the tide fifteen feet above its present swell at high water. It would swamp out New York. As a proof of this, he referred to the fact that the tide at Montauk Point rose four feet, as it did also at the Narrows, but at the confluence of the tides, Throgg's Neck, it rose eight feet. The tidal wave flowing into New York harbor meets the down flow of the Hudson at the Battery, where it is forced up the East river and through Hell Gate, expending its force in filling the bays of Long Island sound. To a person standing on Pier No. 1 North river, the anomaly is presented of an ebbing tide and rising river, caused by the outflow of the Hudson damming up against the inflowing tide-wave. If the outflow of the Hudson did not force the tide-wave up the East river, the rise of the tide of New York would be equal to the drainage of the Hudson, added to the height of the tidal wave, or about fifteen feet above the present height. It would thus seem that it would be dangerous to interfere with the free flow of the East river.

Returning, the Commissioners visited Willett's Point, which General NEWTON is trying by blasting to annihilate, and thus remove forever the terrors of Hell Gate. By the efforts of eighty-two Cornish miners a gigantic hole, twenty-eight feet deep and three hundred feet in circumference, has been excavated through the solid rock. It is intended that the excavation shall be deepened to thirty-two feet. Nine tunnels have been cut in the side of the chasm, extending under the waters of Hell Gate, which, when connected by lateral galleries, will be filled with powder and exploded. It is expected that the force of the blast will make a sufficiently clear channel for the largest ships to pass through safely.

The Commissioners landed at the foot of East Twenty-sixth street, thanking Captain MCKAY heartily for his kindness.—*New York Tribune.*

Survey of the Nicaragua Route for a Ship Canal.

By COL. O. W. CHILDS, C. E.

[Continuation.]

DIMENSIONS AND FORM OF THE TRANSVERSE SECTION OF THE CANAL IN EARTH.

THE water in the canal is to have a depth of 17 feet, and a bottom width, except in cases of turnouts, of 50 feet; 9 feet above the bottom, or at the base of the slope wall, the width is to be 86 feet; 17 feet above, or at the surface water-line, the width is 118 feet; 21 feet above the bottom, or at the top of the slope wall, the space between the banks is 128 feet; at the inner top angle of the banks, 22 feet above the bottom, the width is to be 130½ feet.

The inner face of the banks rise from the bottom angle 9 feet, with a slope of 2 feet horizontal to one of vertical height; at this elevation a horizontal offset 6 feet in width is made in the face of each bank, from which a slope of 1½ feet horizontal to 1 foot vertical rise is carried to the top of the banks.

The top of both banks to be 14 feet wide, and finished with a slope descending 1½ feet from the front to the rear angle. An additional height is to be given to the banks in all cases of the connection of levels with the river.

FORM OF TRANSVERSE SECTION OF CANAL IN THE ROCK PORTIONS OF THE SUMMIT LEVEL.

The canal is to have a bottom with of 50 feet; it is to be 77 feet wide 9 feet above the bottom, and 78·33 feet in width at the surface water-line. The inner faces of the rock on either side are to rise from the bottom angle 9 feet high, with slopes of 1½ to 1 respectively of base and vertical height, thence to 32 feet above the canal bottom, the faces of the rock to be cut to a batter of 1 inch to the foot rise; at this elevation offsets are to be made forming benches 9 feet wide, to serve the purpose of a towing path, and to prevent deposits of earth in the canal, above the benches, the rock portions are to be cut to a slope of 3 inches to the foot rise, and the earth overlaying the rock to a slope of 1½ feet base to one of vertical rise. The spoil banks of rocks to be laid with uniform slopes and elevation. To enable vessels moving in opposite directions to pass each other, the bottom width of the canal in earth is to be increased to 90 feet, and in rock to 105 feet. An enlargement of the prism is to be made at the head of all of the locks, and at other places, at least one in every mile of length of the canal. The bottom width of that portion of the canal occupying the Rio Lajas will be 100 feet; at all of the cuts through bars in the river the width at bottom is to be 150 feet. The locks, as designed for the canal, are 60 by 250 feet in dimensions of chamber, with 17 feet depth of water in their mitre sills. Appendix marked B contains specifications of the manner of constructing the banks of the canal, also of the locks and other mechanical structures.

Herewith is presented a portfolio volume containing drawings of all the plans described in the specifications, also maps and profiles of the line of the canal in sections drawn to a scale of four chains to an inch; also a map of 16¾ feet in length by 4¼ feet in breadth, upon which is delineated the profile and line of the canal on a scale of 64 chains to an inch, and showing in a more explicit manner the line and plan of the proposed communication between the two oceans.

PRICES.

We come next to consider the prices to be adopted in the estimate of the cost of the canal. That they should be greater than would be required for similar work located in an improved section of this country it is supposed is already conceded; the excess will in part consist in the cost of transporting laborers, and every description of tools necessary for their use in prosecuting the work; several of the staple articles of food for the subsistence of workmen, among the more prominent of which may be included salted provisions and flour; the machinery of mills for sawing timber, and carriages with which to transport it from place to place; this excess will also probably be further enhanced by the greater price to be paid for the same amount of mechanical and other labor.

The country along the river being, with some inconsiderable exceptions, uninhabited, and that along the line, between the lake and the Pacific, very sparsely populated, the erection of houses for the protection of property and the residence of workmen will be necessary. The roads in the improved portions of this latter section are in a condition very unfavorable for use with lumber carriages, and the streams crossed by them are wholly destitute of bridges; the construction of new roads for hauling lumber, stone and other materials, will be extensively required in the more rough and uninhabited districts; these, together with the construction of boats for transporting materials on the river and elsewhere, the erection of cranes and other fixtures necessary in prosecuting the work, which must be principally done upon the line, will be attended with much greater expense, and will require more time than similar preliminary work in more favorable localities.

In Nicaragua, carts with wheels carved from solid sections of timber, are usually drawn by four oxen, connected in pairs with rudely formed bars of wood lashed to their horns; altogether a haul illy adapted to the heavy work required in the construction of the canal.

The horses and mules of the country, although quite numerous in the more populous portions, are entirely unaccustomed to the harness, and carriages of every description, except ox-carts of the very rude construction above indicated, are wholly unknown. Although the timber in the valley of the San Juan river, in the immediate vicinity of the location of the dams and locks, also on the western slope in the valley of the Rio Grande, is of as large size and as abundant as in any other equal portions of the country; the large quantities to be used in these structures will require in most cases a large area to furnish it; this, in connection with the hauling of the required quantity of stone from the quarries, will create the necessity of an extensive use of animal power in the transportation of materials.

Oxen of good form and size may be obtained in the country in sufficient numbers, and when made submissive to the yoke, will fully serve the purposes of this kind of animal power. Although the horses are less abundant and of inferior size, they are generally of firm build; the requisite number, together with the first class of mules, could be procured in the country at reasonable rates, and when broken to the harness, would probably furnish a supply nearly equal to the balance of the demand for ordinary light teams that would be caused by the construction of the canal. The remainder, for the more heavy work, would probably be imported.

The foregoing remarks have reference to the comparative increased expense and delays, considered unavoidable, in the preliminary preparations for commencing the work, and attributable only to the remote, uncultivated, and sparsely populated country in which the canal is located.

There is yet a contingency of more importance, and liable by possibility to produce a much greater influence on the cost of the canal than any above named. I allude now to the contingent physical inability of the working classes to perform the ordinary daily labor necessary to a successful and rapid progress of the work, as compared with that ordinarily accomplished in the construction of similar works located in colder and more variable climates. Apprehending the necessity of relying mainly on the labor of foreigners to perform the work, a knowledge of the effect of a continued temperature, varying throughout the year something above that during the months of July and August in this country, upon their health was considered as among the essential elements that should constitute the basis of a fair and reliable estimate of the cost of the canal. The grave consideration to which this subject was deemed to be entitled, induced an early attention to all existing or perceptible causes that might be regarded so liable to affect unfavorably the health and vigor of workmen, upon which the progress and ultimate cost of the work so essentially depend.

It is not known that any more extensive works than the erection of large church edifices and some small fortresses have at any former period been constructed in the country. These furnish some example of the ability of the resident citizens to perform labor; if, however, the labor performed in constructing these works was conducted with the same degree of moderation as is the present common labor of the country, it would give but little evidence of value connected with the information sought.

Although the laboring classes, when under compulsory circumstances, are capable of great activity, and of enduring much fatigue, in their ordinary avocations their movements, so far as observed, generally appeared to be tardy, and the times of their employment irregular; an exception, however, was found in a class of boatmen, numbering about 400, engaged in the transportation of freight on the river and lake; in these we have an example of physical labor and of exposure to the elements scarcely equalled in any country, and endured by them with no perceptible prejudice, but apparently with benefit to their health. The boats used are generally of rude model, without covering, except for the protection of their food and some small portion of freight; they are about 40 to 50 feet long, and of some six or eight tons, and in some cases of greater burthen. In an ascending trip on the river, each boat is propelled solely by the muscular power of from eight to ten men, and in a passage to the lake are forced up an ascent on the length of the river of over 100 feet. The men retire at night on a narrow plank athwart the boat, with no other protection than that afforded by a single blanket. These men are of a very athletic form, and, as a class, notwithstanding their exposure and apparent indifferent attention to the means of health, there are none more capable of hard service, or that are more robust and healthy.

However favorable the general health of the native-born citizens of the country may be, and however great their capabilities for manual labor, it may be said that it does not follow that like capabilities can be invariably claimed for foreigners accustomed to a different climate and habits of life; the fact of the ability of the native citizens to perform the most severe exercise, and that not only without detriment, but rather with advantage to health, is regarded at least as some evidence that foreigners, already accustomed to hard labor, may, when thoroughly acclimated, and with no unnecessary exposure, be capable of some labor in this, if not of the ordinary amount usually performed on public works in other countries.

A feature worthy of remark exists in the fact that no swamps or pools of stagnant water were found in the country west of the lake, nor is it believed that there are any between the lake and high tide on the Pacific, for a distance of some 25 miles in either direction from the line. The permanent streams contain soft water, apparently of the greatest purity; and, with the exception of the distance between San Carlos and Toro rapids, and a section in the vicinity of San Juan del Norte, no swamps worthy of note were discovered on the San Juan river.

Of the party engaged in the survey west of the lake, nine were unaccustomed to the climate. After a few months a slight fever, followed by ague, prevented some of the number from continued daily exercise in the field; the disease being entirely under the control of medicine, was in all of the cases of short duration; during a stay of some seven months in this part of the State, illness in the party at no time interrupted the organization so far as to prevent a daily prosecution of the survey.

On the San Juan river some additions to the party of northern men were made, some of whom had been several months in the country; it consisted of twelve persons, exclusive of some native citizens. During the survey of this part of the canal, which occupied about six and a half months, or from March to September, the party generally enjoyed good health, and no individual was prevented by indisposition beyond a day or two from full service during the whole period. Of those engaged as axemen in clearing the line, two were northern men, whose daily exercise exceeded that usually practised by laborers employed in constructing canals, and with no deteriorations to health or constitution.

Having through inadvertence omitted to obtain from Dr. LOVEJOY, the physician appointed to accompany the expedition, his opinion previous to his leaving the service of the company on our return in October last, and attaching much importance to any views he might entertain on this subject, the following correspondence was had.

"ENGINEER'S OFFICE OF THE AMERICAN ATLANTIC AND PACIFIC SHIP CANAL CO.
"SYRACUSE, January 12, 1852.

"TO WM. J. LOVEJOY, M. D., &c.: Sir, Being desirous of arriving at conclusions as correct as under the circumstances as possible in regard to the effect, whether favorable or otherwise, that the climate of that portion of the State of Nicaragua, embracing the line recently surveyed for the construction of a ship canal from San Juan del Norte on the Atlantic to the port of Brito on the Pacific, will have upon the physical energies of the laborers to be employed in the construction of that work; in other words, the extent of the unfavorable influence of the climate, if any, upon the ability of the laboring classes both of Europe and this country to perform continued, or the ordinary daily labor necessary in the construction of the canal; and your, sir, having accompanied the party as physician and surgeon, also as rodman assisted in making the exploring surveys of all the routes examined, also the survey of the lines revised for adoption, and having pursuant to instructions taken meteorological observations, and notes of other existing conditions essentially connected with a truthful development of the information desired, I would thank you in aid of the object above stated, to favor me at your earliest convenience with the views you may entertain on this subject.

"Very respectfully, &c., O. W. CHILDS."

"O. W. CHILDS, ESQ.: Dear Sir, Yours of the 12th ult. is received; I hasten to reply.

"During the term of my employment in Nicaragua, a period of nineteen months, there were few foreigners residing in the country, and only a small proportion on these being of the laboring classes, but little opportunity of observations of practical tests of the question alluded to in yours was afforded, if I except that of the party with which I was connected; beyond these, the opinions I may express are to be regarded as founded mainly in hypotheses.

"In addition to drought, humidity and salubrity, physical climate comprehends the degree of heat and cold prevailing in any country. The substances most deleterious to health, especially in sections unimproved, being produced by the decomposition of animal and vegetable matter, the rapidity of this decomposition, and consequent amount of malaria set afloat in the atmosphere, much depends upon the degree of heat and moisture, elements essentially connected as well with the growth as the rapid decay of vegetation. The extent to which

the atmosphere may become impregnated with this substance, consequently the extent of its effects upon the health of the people of the country are also subject to great modifications by the currents of air or the degree of the prevalence of the winds, and by the quantity and period of the rains; as the former cause will probably produce a material and highly favorable influence to health, upon the line of the canal in Nicaragua, it is somewhat to be regretted that more full and careful observations on this subject were not made.

"The following statements show the average temperature, and the highest and lowest during each month, from September 1, 1850, to September 12, 1851, as observed each day at six o'clock, A. M., and at two and nine o'clock, P. M., at several localities in the State of Nicaragua. Also the average and the highest and lowest temperature during the months of June, July and August, at Lansinburgh, lat. 40° 47', and the two latter months at Jamaica, Long Island, in lat. 40° 41', as taken from the annual report of the Regents of the University of this State for the year 1850; also the average of the same months in 1845, at thirty-five localities; being all at which observations were taken in this State, as per Regent's report for that year; which is given for the reason that none of later date is at hand.

Months.	Average Thermo.	Highest Thermo.	Lowest Thermo.	Range.	Remarks.	Prevailing Winds.	
State of Nicaragua.							
September..	72° 80	88°	71°	17°	Bet. Lake and Pacific	S. East	Wet season.
October	77°	86°	70°	16°	" " "	"	
November..	78° 42	86°	74°	12°	" " "	Easterly	
December..	77° 11	84°	72°	12°	" " "		
January....	76° 40	87°	69°	18°	" " "	East N.East'y	Constant and high season—dry season.
February...	76°	84°	70°	14°	" " "	"	
March.....	77°	85°	72°	12°	" " "	"	
April.....	78° 83	89°	72°	16°	Fort San Carlos.	"	
May	78° 29	91°	68°	23°	Near head of River.	Easterly	
June.....	77° 14	85°	71°	17°	" Castillo Rapids.	"	
July.....	76° 9	86°	71°	15°	Las Balos Rapids.	S. East'y	Wet season.
August.....	76° 20	86°	71°	15°	NearColorado Branch	"	
Sept. (12)....	79° 10	86°	74°	12°	At San Juan del Norte	"	
Total mean.	77° 42	6° 45	71° 15	15° 30			
State of New York.							
June.....	71° 02	95°	45°	50°	Lansingburgh.		
July.....	73° 84	94°	55°	39°			
August.....	70° 15	92°	42°	50°			
Total mean.	71° 50	38° 66	47° 33	46° 33			
July.....	76° 65	98°	63°	35°	Long Island.		
August.....	73° 61	93°	60°	33°			
Total mean.	75° 15	95° 50	61° 50	34°			
July.....	69° 22	95°	40° 60	45° 50	35 Localities.		
August.....	72° 38	91°	50° 20	40° 74			
Total mean.	70° 80	93°	49° 93	43° 07			

"It appears from the above statement, that the mean annual temperature at Nicaragua is about 6° higher than the average of the months of June, July and August in Lansinburg and 2° higher than July and August at Jamaica, Long Island, was about 6½ above that of the same months throughout this State in 1845; that the average of the highest temperature of each month is for the year in Nicaragua about 7° less than that of the three months at Lansinburgh, and about 9° less than that for the two months at Jamaica, and 6° less than that averaged for the two months throughout the State in 1845; also, that the average of the range in Nicaragua is 31° less than in Lansinburgh, 30° less than at Jamaica, and 28° less than the average in this State at the times as before stated, and that the average of any one month in Nicaragua is also less than either of the others given in the statement, thus showing a material difference in uniformity of temperature in favor of Nicaragua, and comparatively small difference in average temperature against it; the former requires a constant effort on the part of the human system to accomodate itself to these changes, and the latter also demands of the system efforts to enable it to sustain itself under the debilitating influences of the greater heat.

"Dryness and humidity, however, as also heat and cold, affect the human system very much in proportion as they are constant and uniform, or as they are fluctuating and in extremes. Although the heat at a given locality might not of itself be so great as sensibly to prejudice health, yet, as an agent, when sufficient to favor a rapid growth and decay of vegetation, would, with a humid atmosphere, and subject to no mitigating circumstances, be productive of disease. In Nicaragua the degree of heat and its uniformity is shown in the statement; the amount of its action with humidity upon the other elements producing primary cause of disease, is only inferable in degree, from observations of the profusion or paucity of these elements, and of the effect of their continued operation upon the health of the people subjected to their influence.

"Dr. JOHNSON, English surgeon in India, and author of a work on the influence of the tropical climates on Europeans, says, 'That although in India, under the influence of exposure and neglect of temperance in diet, result ardent fever with some serious local determinations to the cerebral organs and to the liver, yet it is to be admitted, that with the practice of the proper precautionary measures, or such as were dictated by common sense and experience, at the stations, the very hottest have proved the healthiest of the seasons.' 'From the result of my observations in active field service in Bengal and in Ava, I am led to conclude that more heat, unless combined with intemperance in drink and other excessive habits of the people, is very rarely the direct cause of disease.'

"'The troops from Bengal and Madras, in crossing the desert of Kosseir, were exposed to a temperature ranging from 80° to 95° in the shade, and from 100° to 110° in the sun, yet with no indulgence in excesses, they enjoyed excellent health.' 'In Bengal, with all its vicissitudes of climate, the English have, by dint of prudent management, accommodated themselves to the climate.'

"In Nicaragua, as in other warm climates, the equable determination to the surface consequent on the higher temperature, produces a favorable influence on the general health. This remark is also applicable to the foreigner, by whom this augmentation of the sensible perspiration is borne, not only without injury to the constitution, but rather with an agreeable sensation. This view of its effects is fully sustained by the robust and hardy constitution of the native boatmen on the river, and by the improving health of those of our party, when their labor was not severe and perspiration excessive, during the last five months of our operations in the country.

"In that part of the State with which I became familiar, the quantity of decaying vegetable matter on the surface appeared very much less than in the forests of the north. This I attributed to a less fall of foliage, owing perhaps to the perennial character, and to its being borne off by the much heavier showers which occur in that country, and to its destruction by the numerous ants which subsist upon it. The malaria produced by the decomposition of these substances, is, to a great extent, diluted and dissipated by the high and almost constantly prevailing winds from the northeast and east, during the dry season, which very much lessens the effect this substance would otherwise have in producing intermitting and remitting fevers, and tends to render these diseases less frequent and of a mild form.

"There appear to be no swamps or stagnant waters west of the lake, excepting near San Juan, on the Atlantic, I discovered none in the vicinity of the line on the river, where, as I understand it, there is much work to be done. The water of the country, though warm, is generally good.

"The diseases most common in the country are intermitting and remitting fevers, and, as I was informed, diarrhœa and dysentery occur to some extent in some seasons, though very little fell under my observations. The fevers seem to rise more from a depressed nervous system, combined with checked perspiration and biliary secretion, than from the malaria of the country; if the latter is the prime agent, it appeared not to act with great force in the cases I saw; to restore these functions, appeared to be all that was necessary to restore the patient to health. The first sickness in the engineer party commenced about two months after their arrival in the country. It was remitting fever, lasting from ten to fourteen days, uncomplicated and easily controlled, yielding readily to febrifuge remedies after a little previous preparation; this, in most cases, was followed by ague. Fever to some extent prevailed in the party, through November and December, after which, with some little exceptions, the party remained healthy.

"From my observations, while in the country, of its climate, of the habit and health of the native citizens, and of foreigners, of whom there were a few residing in the city of Rivas, Granada, and other parts of the State, I am of the opinion that it is as healthy as many sections of equal extent and improvement in our Western States, and that Americans and Europeans may reside there with at least as good health as is enjoyed by the people of those districts; that all would not suffer in becoming acclimated is also more than probable. Of the Northern men comprising the engineer party, there were four—of whom myself was one—who, although equally exposed with the others, was not prevented by any disease of the country from continued daily service. In the general views I entertain of the salubrity of the climate, I believe I have the concurrence of Dr. CLARK, of Pennsylvania, for many years a resident in the practice of medicine in Nicaragua, and of other intelligent gentlemen, the latter now residing there, with whom I conversed; I have also the authority of Dr. CLARK in stating that no case of yellow fever ever occurred in Nicaragua, and that the country, with some little exceptions, has ever been free from epidemic disease.

"Dr. DRAKE, author of a work on the diseases of the valleys of North America, remarks, "that it was formerly believed that white men were incapable of enduring the heat to which they would be exposed in cultivating the field below 33° of latitude," a popular error of public sentiment long since exploded, leaving behind it evidence of the more modern improvements in the science of physiology and of the enterprise and perseverance of the people.

"In constructing the canal, the degree of exposure to disease will probably be different at different localities; with few exceptions, however, there will, in this respect, be much uniformity; the difference will be mainly produced by the difference in the amount of vegetable matter contained in the earth to be exposed (by excavations) to the air. The analysis of a specimen of earth, obtained from the borings near San Juan, gave of vegetable matter 16½ per cent.; the analysis of another specimen, obtained a little more distant, gave 11¾ per cent. These specimens were obtained from localities supposed to contain a much larger proportion of vegetation than any other upon the line. The latter, however, from ordinary inspection, appeared quite a pure earth, and probably did not vary much in composition from any of the alluvial formations of the valleys of the country.

"Notwithstanding that an equable temperature, averaging something higher than that of the hottest months in this country, may not alone be productive of disease, and although the disease most common in such countries may be less malignant, less frequent, and less in variety than those of a colder and more fluctuating climate, yet I am aware there is a prevailing opinion, that the uniformly higher temperature is productive of that degree of lassitude and general depression which disqualify men for active service, and renders them incapable of much physical exercise; that this conclusion, if correct as a general principle, is applicable to the line of the canal in Nicaragua only in a very limited degree, is strongly indicated, if not rendered certain, by the strong constitution, uniform good health, and great physical powers of the boatmen and of many others of the laboring classes in the country, and the benficial effects attending those of the party whose daily exercise, while surveying the river, exceeded that of any common laborer on public works.

"The idea that the heat of Nicaragua is of itself sufficient to produce disease, is not entertained. The large annual fall of rain, by frequent and heavy showers, bears with its waters in passing from the surface much of the elements of disease, and being accompanied with winds, tends to the coolness and salubrity of the atmosphere during the wet portions of the season. In the dry season the temperature through the day is rendered agreeable by almost constant high winds; the nights of both seasons are generally cool.

"The prevalence of sickness among the workmen will much depend on the degree of temperance they practice in eating and drinking, their exposure, and the general care and attention they give to the means of health. That some, with the practice of all reasonable precautions, will, in becoming acclimated, to some extent be sick, is quite probable, and others with whose constitution the climate is better adapted, will reside there with uniform good health; this is the effect in cases of emigration in this latitude from the Eastern to the Western States, and of foreigners in this country.

"On carefully considering the causes of disease as they exist in Nicaragua, I can discover no good reason for apprehending more sickness in constructing the canal in that State, than has been experienced on some portions of the public works in this and some of the Western States; and that men with temperate and industrious habits, being well provided with comfortable lodgings and a diet adapted to the climate, and subject to no unnecessary exposure, will, after becoming acclimated, do nearly as much labor as was formerly done on similar works in the new or unsettled portions of the State of New York.

"A peculiar feature on the isthmus between North and South America, is the valley extending from ocean to ocean along the line as surveyed for the canal, and through which there is almost at all times an invigorating current of air, which will be increased as the improvements on the river become extended.

"The construction of the canal through some of the valleys of this State was attended with much sickness and loss of life, that might have been avoided by a judicious system of medical police. It is to be hoped that the company, in constructing that canal, will, from considerations of philanthropy, if not from motives of interest, pay more attention to the subject.

"On that canal, as on most others in new or uncultivated districts, the health of the workmen, consequently their ability to perform labor, will, as before remarked, much depend upon correct regimen, regular exercise with proper guards against exposure, while intemperance and general indulgence in excesses will result in crippled energies, disease and death. West of the lake the uniform temperature and delightful breezes which sweep across the country from lake to ocean, produce a salubrity of climate scarcely excelled in any country. In the immediate vicinity of San Juan, on the Atlantic, for reasons before given, I think the country less healthy.

"Very respectfully, etc., WM. I. LOVEJOY, M. D."

—*Journal of the Franklin Institute.*

TO BE CONTINUED.

On Known Association of Inorganic Matter.

By T. A. READWYN, F.G.S.*

THERE are found scattered up and down our unsatisfactory mineralogical literature about 1,000 so-called mineral species, and over 1,500 varieties; 250 or more of these are of doubtful character, and might, I think, be struck out of the list of minerals altogether. DANA, in his last (1868) edition of his "System of Mineralogy," mentions 838 species, and, at the same time, very properly expresses his doubts of many of these. The (1870) "Index to the Collection of Minerals in the British Museum," names 634 species, and 682 varieties, as contained in that magnificent collection. Three years ago I hastily published the best list of minerals that I could compile. This list, thanks to good and ill nature combined of criticism, and the assistance of friends, is much improved, and I have now succeeded in compiling an alphabetical list of the minerals of the books, and from that list I have arranged a basis list, to which are attached the most reliable published analyses, both British and foreign. From the analyses I have constructed a table which shows at a glance the known mineral associations. I by no means vouch for the absolute correctness of these relations even so far as they go, for I know much to the contrary; but of this I am quite certain, that they can very easily be considerably corrected and multiplied, especially as regards what are at present called the *rarer* minerals. The table plainly shows the imperfection of the published analyses, and the many gaps that may and ought to be filled up forthwith.

There are said to be at present 66 elementary or simple bodies, and it is most interesting, as well as important, to observe their several degrees of intimacy, and to speculate upon what other relations they may bear to each other. The mineral species, arranged under their respective bases, numerically stand somewhat as follows: Aluminium 195, iron 125, calcium 94, carbon 70, copper 65, lead 64, magnesium 58, silver 40, nickel 28, manganese 28, zinc 25, sodium 20, bismuth 18, cobalt 17, uranium and antimony 16 each, cerium and zirconium 12 each, yttrium 10, potassium and gold 9 each, mercury 8, arsenic 7, barium 6; palladium, silicium and titanium 5 each; hydrogen and nitrogen 4 each; chromium, oxygen, sulphur, tellurium, and tin 3 each; cadmium, irridium, ammonium, molybdenum, selenium, strontian and thalium 2 each; beryllium, boron, cæsium, chlorine, platinum, ruthenium, thorium, and tungsten 1 each; bromine, columbium, didymium, erbium, terbium,

* Read before the British Association for the Advancement of Science.

fluorine, indium, iodine, osmium, lithium, phosphorus, rhodium, rubidium, tantalum and vanadium *nil*. Of this large number of mineral species, those which we are accustomed to call the *useful* metals number only about 86; of these iron claims 15, copper 14, silver 10, mercury 6; gold, lead and antimony 5 each; zinc, cobalt and manganese 4 each; arsenic 3; iridium, nickel and tin 2 each; platinum, palladium, chromium, titanium and bismuth 1 each; and it is rather remarkable that the minerals used and admired for the purposes of ornamentation are numerically about the same as those called the *useful* metals.

In the table referred to it is shown that of the 66 elementary substances, their obvious relations, according to the published analyses, are numerically as follows: Oxygen and iron 50 each, calcium 46, aluminum 43, manganese 42; silicium, hydrogen, copper and lead 39 each; sulphur and magnesium 37 each; carbon 33, uranium 31, yttrium 29, cerrium 28, zinc and sodium 27 each; zirconium, potassium and silver 24 each; nickel 22; cobalt, phosphorus and antimony 21 each; bismuth and beryllium 19 each, mercury and arsenic 18 each; barium, chlorine and thorium 17 each; gold, chromium, lantharium and tin 16 each; fluorine 15, molybdenum and hydrogen 14 each, titanium and vanadium 13 each, boron and iodine 12 each; platinum, selenium and tellurium 11 each; iridium, strontian, tantalum and tungsten 9 each; lithium and columbium, or niobium, 8 each; cæsium and palladium 7 each, cadmium 6, bromine, didymium and thallium 5 each; indium and rhodium 4 each; erbium, osmium, rubidium and terbium 3 each; ruthenium 2.

In the table the chemical symbols are arranged alphabetically, for easy reference; but it can be better utilized if the elements are taken for consideration in something like the following order:

1. Those conveniently called the four generators of organization, (organogens)—the acid-former and life supporter, oxygen; the air-former, nitrogen; the water-former, hydrogen; and the fuel-former, carbon.
2. The four fire-formers, (pyrogens)—selenium, phosphorus, sulphur, and tellurium.
3. The two glass-formers (hyalogens)—silicium and boron.
4. The four salt-formers (halogens)—chlorine, fluorine, bromine, and iodine.
5. The six metals of the basic salts—potassium, sodium, lithium; rubidium and cæsium, rare; and the hypothetical ammonium.
6. The four alkaline earthy metals—calcium, magnesium, strontian, and barium.
7. The ten earthy metals—aluminium; beryllium, zirconium, yttrium, thorium, eorium, lanthanum, erbium, didymium, and terbium, rare.
8. The eight noble metals, whose oxydes are reducable by heat alone—gold, silver, mercury, platinum, iridium, osmium, rhodium, and ruthenium, rare.
9. The eleven heavy metals, whose oxydes form powerful bases—lead, copper, iron, zinc, manganese, nickel, chromium, cobalt, cadmium, uranium, and palladium.
10. The twelve lighter metals, whose oxydes form weak bases or acids—tin, bismuth, antimony, arsenic; vanadium, tungsten, tantalum, titanium, molybdenum, columbium, thallium, and indium, rare.

These statistics are the result of a careful analysis of our *paper books*, which, as I have said, are by no means to be relied on. I feel, however, very positive that if the *stone books* of nature be more deliberately opened, this table will undergo much revision, and a greater number of relationships will be set up. I have, therefore, placed before the Section these notes suggestively, for the prompt application of spectrum analysis in the determination, qualitatively, of the composition and relations of many inorganic substances that now hold a very ambiguous position in mineralogical science.

Geologists, as a rule, are apt to undervalue mineralogical relationships. This, to me, appears a mistake, for, as with specimens of humanity so often with minerals, it may be said, "Tell me what company you keep, and I will tell you who you are."

MINING SUMMARY.

South Africa.

A correspondent of the New York *Herald* writes as follows: South Africa seems to be the chosen land of sensations. Only three or four years ago, a report went forth to the four corners of the world that gold fields of wonderful wealth had been found, and were waiting silently to yield large fortunes to the sturdy arms of industrious diggers. The particulars of the discovery were told with painful exactitude. The report of the geologist, Herr MAUCH, who had first unearthed the hidden precious ore, detailed minutely the scientific proofs of the presence of the glittering metal in its reputed bed, which he had himself carefully examined with pecuniary satisfactory results. Then there came at length the accounts of numerous lucky miners. Inflamed by these moving representations, two cargoes of Australian diggers left antipodean fields to back in the smiles of such promising prospects. They soon found that they had been cruelly deceived, and after a bitter struggle with hunger and privation, returned to Balarat and Bendigo. The world is now treated to a yet more exciting rumor. Diamonds, it is said, of almost fabulous value, have been found in this land of extravagant promises. Will this report also prove a hoax? It is certainly supported by a little stronger testimony. Some of the diamonds have actually found their way to Europe, and one of them proved to be worth no less than £40,000 ($200,000). But the colonists seem, for some unaccountable reason, to be unnaturally anxious to bring in as many strangers as they can get to share their good fortune, and one can hardly resist the suspicion that these diamond mines are intended to serve the same purpose as did the gold fields—a trick to bring up to a healthier and greater volume the ever-diminishing stream of South African emigration.

In New York there is, fortunately, a gentleman—Dr. WINTHALL—who has arrived from this remote and little-known land at a comparatively recent date, and who, in the course of a couple of visits to its attractive shores, has made himself pretty familiar with its natural features and probable prospects. Dr. WINTHALL went to South Africa for the first time in 1862, stayed there about a year, and then returned in 1867, and remained through a couple of years until about fifteen months ago, when he again came to this country. The object of these visits was to see his friends, some of whom live some two hundred and eighty miles from Port Elizabeth, on the direct road to the reputed seat of the diamond mines. He has also made an excursion as far as the Vaal river, crossing the Orange, in whose valley

THE FIRST DISCOVERY

of the glittering gems was made. In the course of an interview with this gentleman a day or two ago, the *Herald* reporter obtained the following interesting details as to the route to the diamond country, and the discoveries already made. Even while Dr. WINTHALL was in the colony the first "finds" of diamonds were made, and he now regrets extremely that he did not stay, and try his luck in this fascinating lottery. But at the time the fever for diamond hunting and the belief in its lucrative results had not yet obtained the height which, from the most recent files of Cane colony papers received, it seems now to have done.

"Do you know, doctor," said the writer, "when the earliest discovery of diamonds took place?"

"The first diamond was found near the Orange river. A Dutch trader, travelling through the country, who had formerly, in Holland, been in the jewel business, found a little girl, the daughter of a boor (farmer), playing with a rough diamond, that she had picked up somewhere near the bed of the river. He at once detected its value, and made a trade with her. He gave her a small sum, and threw in a few trifles into the bargain. As soon as he got to Port Elizabeth, he took his purchase to the French consul, who was quite a connoisseur in jewels, and submitted it for his inspection. The consul pronounced it a true diamond, and it was sent to Amsterdam to be cut. It proved to be worth £1,000 ($5,000). The trader, with commercial meanness, kept the entire sum, and all the papers pitched into him, for cheating the poor girl out of her precious plaything. They said he might, at least, have given some percentage of his gains."

"That was the first one?"

"Yes; the second was found in the possession of a Caffre. It is supposed that also had been discovered in the valley of the Orange. The man who first saw it in the hands of the Caffre doubted if it was indeed genuine, and fooled the savage along until he had made him suspicious of its possible value. Even at first the heathen must have had a faint glimmering of its worth, for he had, after the fashion of his race, erected it to the dignity of a charm, and had got the notion in his head that it was gifted with the virtue of an amulet, protecting him against the malice of his foes and the attacks of disease. On this account he wanted, even at the outset, to get a good round sum for it, and this probably made the lucky white man, who was trying to get it, somewhat cautious about being taken in. But when the Caffre found that the would-be purchaser, after taking it to be examined, was very anxious to buy it, he greatly raised his demands. Caffres are at all times very fond of money—fonder even than we are. Finally, he held on to the stone until he got £8,000 for it—enough to set him up splendidly in savage life as a veritable Crœsus. No doubt he bought dozens of wives and hundreds of oxen and thousands of sheep, and perhaps he is now living very happily. He deserves to, for his amulet has been the potent germ of the present diamond fever. Its purchaser sent it on to Europe in the charge of a Dr. HOFFE to be cut. The Amsterdam merchants estimated its value at £40,000 ($200,000), and at that figure it was bought by its present owners, Messrs. LILIENFELL Bros., of Hopetown."

"But you left, I suppose, before the real value of the stone was known?"

"Yes; if I had known that such prizes were going I should have stayed and done my best to take a hand in. The reports afloat were so exaggerated that most people wholly discredited them. There were also some other reported discoveries of diamonds, of greater or less size; but I did not pay much attention to them. I have lately got a letter from my brother-in-law, Mr. EDWARD NATHAN, of Grafireinett, which tells me that many more finds have been made—some of them very important ones. He says the colony is now in the full flush of

A THOROUGH DIAMOND MANIA.

Many men are throwing up their employments to go gem-hunting. The colony is, indeed, very much in the same condition as we read that Australia and California were when the gold fever broke out."

"It is rather difficult, though, to get to the diamond country, isn't it?"

"Well, yes; but not so hard as some of the reports make out. I have been all over the very country where the discoveries have been made. The journey is not a very long one, and to young, healthy men, not afraid of a few hardships and privations, by no means an unpleasant one."

"How do you get there?"

"You start at Port Elizabeth. The first place you come to is Nitenhaga, about twenty miles from the coast. That is a little farming place of not very great importance and with a very limited population. Then you have to get through about 250 miles of rough country, over high mountains and through narrow defiles, until you get to Graffreinet. That's where my brother-in-law lives. All the way there are no towns, only scattered, straggling settlements, here a farmhouse and there a vineyard. But at regular intervals there are little shanties, like the bush inns in Australia, where you can get plenty to eat and tolerably good accommodation if you are willing to pay for it. You can even get a private room, if you like to disburse money enough for such a civilized luxury. Few people, however, who go to such a country care much for such ridiculous comforts. The food is plain, but good—plenty of mutton and goat and venison, but no beef. The liquors are very good. They are all really imported, and are better than you get in a bar-room in New York. The expense, however, is frightful. It cost me about fifteen or twenty dollars a day for myself, servant and horses."

By the way, how did you travel, Doctor?"

"I had a wagon, stout and substantial, and with pretty hard springs, but tolerably comfortable, drawn by a team of four fine horses. The horses of South Africa are wonderfully enduring. They are of a peculiarly heavy and yet fleet breed—something like the Flemish dray-horse you see in London—and will make very good—indeed, surprisingly fast time. They go on an average about twelve or fifteen miles an hour. This is as fast as a Russian drosky travels. The "boors" drive their horses, say for an hour and a half at this rate, and then hobble them and let them graze and rest for a while. In this way you can make without much difficulty seventy or eighty miles a day. The horses are indeed one of the most wonderful institutions of the country. They are a cross of the English horse on the original Dutch stock of the colony. At another time I got over a hundred and thirteen miles with a team in one day. I had two servants, a Malay and a Hottentot. The Malay was my driver. The Hottentot only held the whip—a huge thing, with a long handle and a thong some twenty or twenty-five feet long, that in skillful hands could be made to give a report as clear and as sharp and as loud as from a rifle. The driving through the mountains is very dangerous, and it takes one man all his time to keep the horses well on to the track. The dexterity of the Hottentot with the whip is surprising. He would fairly make the horses mad with excitement, and would wonderfully help the driver by frightening the horses into the road when they seemed inclined to swerve from it.

"How are the roads, Doctor?"

"As I said before, the country is a very difficult one, and very mountainous. But I must do the government the justice to say that they have made splendid roads right into the heart of the country, and they maintain them in magnificent order. They have a great many English and native convicts that they keep at work upon them all the time. The danger in traversing them results necessarily from the nature of the country and the high speed at which you pass over it. Now you go apparently sheer over a high cliff by a winding, wriggling sort of road, scrambling as well as you can to the bottom of the gulley, as one might say, down the very face of the sheer rock. It is fearful sometimes to see how you are going, and you give up all hope of getting through with a whole skin and an unbroken neck. But I never met with an accident, and perhaps one rarely happens."

"Well, what kind of a place is Graffreinett?"

"A beautiful little town of about six thousand inhabitants, seated in the heart of smiling mountains. It is called Graffreinett because the first settler's name was GRAFF. When some more people came there they did him the compliment of asking him to name the infant settlement. He called it Graffreinett, because GRAFF was his own name, and REINETT was the name of his wife. He put the two together, they have stayed together ever since, and Graffreinett the place is now and probably ever will be. It is surrounded with orange groves and lime and lemon plantations and vineyards. A good deal of wine is made there and exported. Maize, wheat and vegetables of all kinds are raised. Only the Hottentots, however, use the maize for bread, and they subsist almost entirely and seem to grow fat upon it. The white settlers have a prejudice against it. I don't know why. They do use it, though, in one form—something like our mush and milk."

"How far is Graffreinett from the diamond regions?"

"About two hundred and twenty miles. After you leave it you come first to a high and difficult mountain, called the Oderberg. That is only half an hour's ride from the town, or about six or seven miles. There is a rough kind of a hotel just the other side of the mountain, a miserable little shanty, but pretty well provided with creature comforts. From there you have a journey of 110 miles to make through a bad country, but over good roads, until you get to Hanover, which is a small village and has some curious features. I owes its existence not so much to trade or agriculture as to the piety of the Dutch farmers. They are all Catholics and singularly fond of an occasional religious spree. They are scattered all over the country, at such remote distances that of course they are unable to maintain regular churches and pastors. They compromise the matter by coming into Hanover a few times a year and indulging in confession and a few masses and such like. They drive in with their families, say on Saturday, stay over the Sabbath, clear off old scores with their Creator, and then amuse themselves with shopping at the two or three general stores there and in the town, and dancing, and perhaps a wedding. Most of them own shanties in the village, which are empty, except on these occasional visits. To build a little house in that country does not cost very much, and they prefer doing that to camping out. There is only one little Catholic mission church in the place, ministered to by a very good and popular priest, Father Berger. Goldsberg, on the Orange river, in whose valley the diamonds are found, is another hundred-mile journey from Hanover. Goldsberg is a very poor sort of a place, but it boasts of a hotel. It is surrounded by mountains and lies in the narrow valley of the river. It is colder than Caffrenielt or Hanover, and is about the temperature of what might be called an apple country. The Orange river in the summer is perfectly dry; whenever the dry season is at all long I have myself walked in its bed. But after the rains it is a grand sight. The volume of water is fearful, and rushes past with frightful violence, sweeping away everything before it. Many lives have been lost at such times, and for a great part of the year it is possible to cross it only in ferryboats. The ferryboats are huge scows, and can transport laden teams when the current is not too strong, which is only immediately after the rains.

"To the Vaal river from the Orange is about three days' journey. All the country between the two rivers is the diamond country. It is very mountainous, and as I passed through it I was struck with the want of enterprise among the people in leaving them unmined. I thought that a few smart Yankees would soon bring to the light of day its vast mineral wealth. Not only diamonds exist there, but coal and iron and copper. I am sure of it. After crossing the Orange, about three hours beyond it, you come to the little town of Philapolis, or, as the English have rechristened it, New Philadelphia. That is not much of a place—only a few houses and a hotel. Then you cross a river, very deep and full of fish, and after two days' hard travel come to Blumfontein, on the Vaal. The Vaal, as a river, has much the same characteristics as the Orange."

"What do you candidly think of this diamond rush, doctor?"

"Well, I think, from my private advices, that it is a genuine thing. The gold fever was, indeed, a hoax, got up by large landholders to bring emigrants to the country, and thus beat down the price of labor. But there are diamonds to be found in the world; of that there can't be any doubt, and I think that Cape Colony is exactly the right place to look for them. The country seems to the traveller to speak eloquently of hidden treasures. You can't pass through the mountains without the thought rising in your mind that they are big with wealth. I am thinking seriously of going back. If any Americans want to go with me I should be pleased to do all I could for them. I know the country well, I speak the language of the natives, I have friends and relatives there, and I am perfectly willing to head an expedition of American diamond-hunters. However, I shall wait a little longer, until I receive yet more definite information from the colony, and then, if the reports maintain their present promising and brilliant coloring, I shall go to try my luck, alone probably, but, if adventurers offer themselves, as the leader of a band of fortune-hunters."

"Well, Doctor, I wish you the best of luck, and with thanks for your very interesting information, I bid you good morning."

Colorado.

THE GRAND ISLAND MINES.

The Central City *Herald*, Oct. 19, has the following account of the mines of this district: "There are less men engaged in prospecting in this district than a month ago. A large part of the settlers have either gone to work on their own discoveries or for other parties

working mines. The population continues about the same. Mr. CUTTER has about thirty men employed in building the new road from Cariboo to Brown's ranch, *via* the Boulder County and Sovereign People lodes. This will furnish a wagon and carriage road with as easy a grade as that between Black Hawk and Central, and will take in its course nearly all the best lodes lying below the town. It is unusually well constructed for a mountain road, with the advantage of being much shorter than the old route. There is a demand for men to work on this road, and also for miners. The latter receive $3 25 per day. Building is as active as ever. SEARS & WORLEY'S new frame will soon be completed; its dimensions are 24 x 60, and two stories in height. B. WOODBURY is putting up a building 26 x 40, and J. J. MILLER one 24 x 30, both being two stories in height. LEA & OYLER have built several houses for to rent. LEO DONELLY'S new store is completed, and is stocked with groceries and miners' supplies. A large addition is being made to the Cariboo House. The Cariboo mine is yielding a larger and better quality of ore than ever before. The former owners had shipped to HILL, within a few months preceding the sale, over $30,000 worth of ore, the best of which, taken as it came from the mine, went but little over $300 per ton. First-class ore lately sent by CUTTER yields 800 ounces, or considerably over $1,000 per ton. He has shipped forty tons of ore to HILL, valued at $30,000. He is building a shaft house 130 feet in length, and will put up a whim next week. A new shaft has been sunk, while the old shafts and drifts are being worked with the same favorable results. The discovery shaft has been sunk ten feet within the past two weeks, its depth being now eighty-five feet. The middle shaft is down forty-five feet, and the west shaft twenty-five feet. On the east half, W. J. MARTIN, of and for the old Cariboo company, has sunk a new shaft to the depth of twenty-five feet, which he will timber at once. He will also put up a whim and commence raising ore, of which there is a very fair quantity in sight. MARTIN & Co. have a large quantity of ore out, from the new shaft on east half of the Cariboo, which they will ship at the earliest opportunity. Teams are in demand for transporting ores to Black Hawk. J. P. LESHER and JOSEPH SHAW have a very valuable lode called the No Name, on which they have run a shaft to the depth of over twenty feet. Ore from this lode assayed over $3,000 to the ton. The Columbia lode is yielding very fine quartz, which is shipped regularly to HILL. TOMLINSON & Co. have a lode which contains a foot of very fine mineral. Assays give a return of from $400 to $1,700 per ton. Among other new discoveries are the Stalker, containing very rich ore, and MATHER, STEELE & Co.'s lead, near the Idaho. The Shamrock lode, discovered by WALKER, RILEY, SQUIRES, and HAYES, promises to be one of the best in the district. It has a four-foot crevice of fine looking quartz. One load has been sent to HILL, and another has been taken out ready for shipment. JAMES PALMER has the east extension of this lode. The Welcome lode, discovered and owned by KENNEDY, is looking well. JOHN MORRIS is working a lode which ranks among the first in quality and body of ore. Mr. HERSINGER is working the Monitor (Everest). Its shaft is thirty-four feet deep, and has lately been timbered. Mr. PUGH has leased four claims on his Sovereign People lode to different parties, who are working them with good prospects. He will continue to work a portion of the lode himself. There is no snow at Grand Island, except small quantities here and there in the timber. It is not expected that mining or teaming will be interfered with seriously for two months to come. The best mines will be worked all winter. The prospect is, that several hundred men will winter at Grand Island, and that next summer will see large accessions to the present population."

GEORGETOWN AND VICINITY.

We gather the following items from the Georgetown *Miner*: "Activity in mining is evidently increasing. The Baltimore tunnel is now 500 feet in length. Prospecting still continues to a limited extent, however. Mr. BAKER is working the Shaffter lode at Fall River with good results. Tunnel sites are the rage here at the present time, and every available place is being taken up and recorded. The Snowdrift and Silver Plume mines continues to produce rich ore in quantity. Mr. SEXTON is drifting east on the Ferry lode, Republican Mountain, with good results. Mining in the lower end of the county on the Edgar and Seaton still continues. The Seaton has paid well this season. The Douglas tunnel has penetrated Douglas mountain eighty feet. This tunnel will develop some of the best galena lodes in this district. A silver brick weighing 801 ounces, 804 fine, coin value $837 78, was shipped from the International mill, East Argentine, a few days since. The Eclipse tunnel, in Griffith mountain, has been driven ninety-four feet. The rock is hard and tenacious, seamed with iron and copper pyrites, galena, and zinc blende. Since our report in last week's issue the Stewart Silver Reducing Company have shipped silver bullion to the amount of $2,21 37. The supply of ore furnished the mill is only moderate, being from eight to ten tons per day. A number of gulch miners from Summit county are passing through town on their way to the valley. Nearly all have their buckskin purses well lined with the golden product of their summer's labor."

DRY CONCENTRATION.

The Central City *Register*, Oct. 19, has the following account of the recent experiments at the Washington mill: "The Washington mill at Georgetown, one of the largest buildings in the place, has had a multiplicity of processes and managers in it at different periods, and as many failures, so that the people learned to look upon it with a superstitious dread when any activity in the way of work was started up, which occurred every year and lasted for about a month, the people would say, there goes another bubble that will soon burst. This was the case when KROM'S dry ore concentrator was put in by Mr. JACOBS in 1869, and so far as his experiments went, it proved no less a failure than previous processes. Mr. BEMENT, one of the owners of the property, came to Georgetown last spring for the purpose of determining his future course for his company, in reference to their Colorado investments. He found the machinery in good condition, and determined upon a last effort to make the Krom separator work successfully on the Georgetown ores. He has devoted the entire summer to his experiments, and, with the aid of common sense and close attention to his work, has so far succeeded that the two machines are kept constantly in motion on ore from the Terrible lode, and to all appearance doing the work well. The machinery now in use consists of a Dodge crusher, with Cornish rollers, three revolving screens eight feet long, and three Krom separators, each calculated to work on different-sized particles of ore. Four men do all the work, as follows: One engineer, one in the crushing-room, one tending the concentrators, and one man of all work. Mr. B. can always be found on the premises, and keeps things up snug. The capacity of the mill is eight tons per day of ten hours. Ninety-seven tons of third-class ore have been sent from the Terrible lode to this mill, and thirty-eight tons of concentrated ore have been sent to STEWART'S works since they commenced working the concentrators. This third-class ore is dressed down two-thirds, or three tons into one, at a cost of $10 per ton on the gross weight. An actual test gave the following results: Ten and a half tons of third-class Terrible Company's ore yielded three tons 860 lbs. of concentrated ore; five tons of fourth-class ore yielded by the same process one ton and 1,216 lbs. of concentrated ore. The present working of these machines is not very close. No mineral escapes with the light rock or waste, but a portion of the rock goes with the mineral. This manner of dressing the rock is a success, as will be seen by the following: STEWART charges for reducing this class of ore $35 per ton; three tons, at $35, $105. For dressing three tons into one, at $10, $30; reducing, per ton, $35; total, $65. A saving to the mine-owner on every three tons of third-class ore of $40. So far this process is a success. The fact must not be lost sight of, however, that this method of separation can only be applied to that class of ores in which the silver is carried by the heavier minerals, such as zinc and lead. When the silver exists principally as a sulphuret the process cannot be worked so closely, and happily does not need to, as this class of ore is rich enough without concentration.

ARGENTINE.

Argentine, says the *Register*, is a busy place at present. The Baker Company have the best show for ore in their mine they have ever had. The Company shipped, on the 10th inst., two large bricks weighing, in the aggregate 2,556 ounces. It is the opinion of the agent, Mr. BECHTELL, that the Company will soon shut down the mill, but work will continue on the Baker and several other lodes during the winter. Capt. LEIGHT has recently gone up there with a gang of miners, calculating to work all winter. Several other parties are developing mines in that vicinity. The Crescent S. M. Co., operating on the Stevens lode, under the management of Mr. T. H. LOWE and Mr. WILLIAM MENDENHALL, are prospering and have a good prospect ahead. They have in construction a suspended wire tramway 900 feet in length from their mine to the base of the mountain, which works entirely satisfactorily. Upon it they have taken up all the material for a frame house 16x25 feet, and have also built a substantial ore house at the base of the mountain. The ore is principally galena, and runs about $200 per ton. Seven tons were recently hauled to Watson's work's, and they are constantly raising a large amount of good ore.

AROUND CENTRAL CITY.

The *Register*, Oct. 19, says: "Mr. JOHN SCUDDEE is putting a wing upon the old Lexington mill to extend out over the tanks in the gulch. It will be sixty feet long by thirty-five feet wide, and contain eighteen pans for the treatment of tailings. Having tried the tailings in another mill, he finds that he can make them pay. He is also putting on a quartz mill room, forty by thirty feet, to be arranged for driving into it from the south side. We are glad to note these improvements. The Roderick Dhu is now furnishing forty-eight stramps with eight-ounce ore. The prize is also furnishing forty-eight stamps with four-ounce ore, besides furnishing seventy-five tons per month of smeling ore. The average price received from February to August, for smelting ore, was $50 per ton, $22 being the lowest and $110 the highest price received. Mr. SCUDDER informs us that arrangements are completed for the consolidation of the Central and University companies, and work is expeoted to commence on the Gunnell lode within two or three months. We make this announcemement with no little pleasure. The Gunnell used to be considered a "stand by," and no one ever thought to see it idle so long.

Utah.

THE EMMA MINE.

The Salt Lake correspondent of the Corinne *Reporter*, Sept. 17th, says: "Day before yesterday the Emma shipped twenty car-loads—two hundred tons—and all this ore returns a clear profit of $125 to $150 the ton. Some $40,000 have been cleared from the mine. But it has 'pinched out' once to a crevice but an inch wide, though they have got below to a good vein again."

GENERAL REVIEW OF THE MINES.

A correspondent of the *Scientific Press*, writing from Salt Lake City, thus reviews the mining field: "Utah makes quite a show in the way of minerals. Iron ore is known to exist in several places in large amounts. In Iron county, works were built in 1852 and a small quantity of ore was smelted, but want of proper fuel compelled a suspension of operations. The Union Iron company, previously spoken of, had two furnaces in operation in January, 1869, and one in the course of construction. Coal has been found in quite extensive beds, but principally in the neighborhood of Coalville, Summit county. Copper, lead, silver, zinc and sulphur occur, and different sorts of building stone abound. The mines at the Little and the Big Cottonwood cañyons, twenty-eight miles south-east of Salt Lake City, are the centre of the present mining excitement. Communication is had with these places by a stage, which runs three times a week. The largest mine at Little Cottonwood is the Emma ledge, located in August, 1868, and owned by the WALTER Bros., J. F. WOODMAN and others. In July, thirty-one car-loads of ore were shipped from the ledge, and that month upwards of $3,000 were paid for hauling. The cost of transportation (by team to Salt Lake City and thence by rail) to New Jersey and the expenses of treatment amount to $90 per ton, but the ore sent averages, I am told, nearly $200 per ton. There are twenty men employed here extracting the rock, of which some fifteen tons are obtained daily. A tunnel is being run in to tap the main shaft, which is down about two hundred feet. I send you a specimen of the ore. There are other promising locations, as the North Star, owned by BRUNO & Co., and the Western State, which takes out some twenty tons weekly. Not far off, over the ridge, is Big Cottonwood cañyon. Here the Empire Tunnel company propose to run a tunnel in towards Little Cottonwood. Here are also the Wellington, Theresa, Davenport and other leads. The general formation is limestone. Mr. C. L. STEVENSON, who has lately visited the various mining districts, gives me the following approximate product of the different mining localities during the month of July. The average value of ore exported was about $105 per ton:

Little Cottonwood	314 tons.
Bingham	6 "
Parley's Park	40 "
Rush Valley	70 "
Deep Creek	10 "
Tintic	30 "
Total	470 "

"SMELTING WORKS.

"Messrs. WOODHULL Brothers have built a furnace here, and have made the first run of this Territory. This run created, naturally, considerable excitement here. The result was a production of five thousand pounds of bullion in thirty-six hours. This assays about $500 to the ton in silver. The metal was hauled to town and stocked up in front of the Elephant store, where it attracted large numbers of people who were curious to see the pioneer bars of Utah. The WOODHULL works are capable of working about ten tons daily. Mr. MILTON ROBBINS is about to put up smelting works. He will have the able assistance of Mr. CHAS. C. RUEGAR, who will take the active management and the construction of the furnaces in hand. Mr. RUEGAR has studied in Germany, and has spent considerable time among the mines of California. He appears to be well fitted for his work. Mr. LEOPOLD BALBACH, a cousin of the BALBACH Brothers, of Newark, N. J., has been visiting the mines of Utah, and was so impressed with their extent and richness that he telegraphed to parties East (he tells me) that he thinks best to erect smelting works in the valley, and these are to be put up. There are others here who engage in buying ores, and the mines are attracting persons from different quarters. There seems to be every reason to suppose that Utah contains valuable mineral deposits, and probably these will be developed quite extensively henceforth."

Nevada.

THE AUBURN MILL, RENO, NEV.

A writer in the *Scientific Press* gives the following account of this mill:—"Your correspondent visited the Auburn Mill, located about 1½ miles from the C. P. R. R. depot at Reno, Nevada. This was originally built to work rock from a lead near by, which did not prove profitable, however, and was abandoned. It is being run at present on rock received from various points on the line of the railroad. The proprietors are purchasing large quantities of ore. A large ditch, three miles in length, conducts water from the Truckee River to an overshot wheel, 32 feet in diameter by 18 feet breast, which drives all the machinery. Mr. J. J. DUNNE, the manager, kindly conducted me through the works. The mill is situated on the side of a hill which gives sufficient fall for one set of machinery to discharge into the other. A rock crusher discharges the ore upon warm plates (warmed by waste heat from the furnace), where it is mixed with a proper quantity of salt and dried. It is then fed into a battery of twenty stamps and crushed dry. The dust is conducted from below the screens by an endless chain apparatus to elevators that discharge it into a perforated plate on the top of a stack or chimney, 30 feet high by 5 feet square at the bottom,—the shaft of a Stetefeldt furnace. The heated air from the furnace passes under the plates below the rock-breaker, thence through an inclined dust chamber, five feet square, up the hill perhaps 75 feet, and terminates in a chimney whose top is 25 feet above the top of the furnace shaft. The chloridized ore is amalgamated in 12 Wheeler pans, whose sides are lined with half-inch wooden staves, to prevent the iron from being eaten up by the pulp; the muller is not let down heavy on the dies, it being necessary to grind after roasting. The pans discharge into six separators. The company have rooms fitted up in the most complete manner for retorting, assaying, etc. They design constructing a side track from the C. P. R. R. in a short time, which will enable them to run the cars into the mill. Mr. BROWN, the superintendent of the works, claims that this furnace saves four per cent. of salt, and that the amount of work done at the Auburn Mill, which required 36 men and 12 cords of wood by the old process, is done by this with 8 men and 2¼ cords of wood. I have met quite a number of miners and mill-men, who speak very favorably of the results from ores worked at this establishment, among others, Mr. D. R. STEWART, Superintendent of the silver mines of Unionville, Humboldt county, Nev. Several tell me that they have previously shipped their high grade ores to San Francisco, but of late they have had considerable worked at Reno, and have obtained decidedly better results; and hence have determined to have all their high grade rock worked there. The San Francisco dealers will have to look out or they will lose this tough ore trade."

British Columbia.

A correspondent of the San Francisco *Bulletin* contributes the following notes on Victoria, and the gold and coal mines in its vicinity: "Victoria, on first view, bears the marks of a city of the past. It is situated on James Bay, three miles from Esquimalt, which is one of the finest harbors on the coast; has a population of 1,200, fine streets, fine brick and stone stores, Government buildings, Government roads (very fine drives), and fine view of bay and Straits, with a fine climate. Though business is dull, the crops are good. Of late a good sized quartz sensation sprung up in the city on the discovery of quartz on Cedar hill, which is four miles only from the *Standard* office, or centre of the town. Had the discovery been one hundred miles away, the sensations would have lasted longer, and perhaps resulted in more present benefit. The discovery was accidental, as many rich mines have been, and it occurred in this wise: Mr. CARGOTICH and party being out hunting grouse around the base of the hill, concluded to ascend to the top and take a rest, and a view of the bay and island (which is a fine one), and while he was sitting on the bald top he picked up a small piece of the rock, which showed free gold to his astonished gaze. He obtained more, had it assayed at the Government office, found $12 per ton reported, and this from the outcropping. In the meantime the town caught the fever, and hailed with joy anything that promised to supersede the oppressive dullness. That there is precious metals in these and other rocks in the vicinity there exists no doubt, but the test by developing the claim is the proof of its existence in paying quantities.

"ANTHRACITE COAL.

"While in Victoria we were shown a pile of 200 tons of this coal, which was taken from the mine on Queen Charlotte's Island, 300 miles north of the city. The Queen Charlotte Coal Mining Company own 6,000 acres on the island, in which veins of anthracite are found. The mines are now in a condition to make returns for the heavy outlay of capital used for proving and developing their valuable property. This being the only anthracite deposit yet discovered on the coast, it is attracting much attention among foundry and steamship companies. There are three veins proven to be three feet veins of unexplored extent. The company have expended about $80,000 for improvements in developing the mine, and are filling large orders for coal from San Francisco. The analysis of this coal, as given by the Government assay office at New Westminster, is as follows, taking 100 parts:

Moisture	5 10
Volatile combustible matter	17 26
Fixed carbon	71 20
Ash	6 04
Specific gravity	1 46

New Mexico.

BURRO.

The Burro *Miner* says: "Reports from the Burro mines, September 11th, say that FRAMPTON and LA MARCHI, while prospecting, were murdered by a party of Mexicans. The Harpending Company have called a miner's meeting for the 17th, with the object of removing the present Recorder and changing the mining laws. A Ralston letter to the *Press and Telegraph*, dated Aug. 31st, says there is very little going on, except to the work necessary to hold the ground."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Oct. 28, 1870.

WHOLESALE.—Since the Scranton sale on Wednesday last, there has been more activity in the Coal market. The average decline of *twenty-nine* cents per ton, which we fully warned our readers of in our last issue, has generally had a good effect upon the market, inasmuch as it has given confidence to buyers, and satisfies them that the lowest notch has been touched; hence they feel no embarrassment in ordering their supplies. This decline was only a continuation of the *war upon prices*, noticed in our last issue, it being conceded by every one in any wise connected with Coal matters, that the sooner the *lowest* prices could be reached, the better. The minimum increase in the production of Coal this year over last, some 2,500,000 tons, which we are satisfied is yet unconsumed, and partly unsold, must be offered at low figures, in order to be moved at all. We think any coal dealer will be satisfied with the quotations we note to-day, and the wise ones will take our advice, and wait no longer. The following tables exhibit the prices obtained at the 88th Scranton sale on Wednesday last, compared with the September sale:

OCTOBER 26, 1870.

10,000	tons of Lump...	$3 77½@$3 90	
12,000	"	Steamer.. 3 85 @ 3 87½	
16,000	"	Broken.. 4 07½@ 4 27½	
14,000	"	Egg..... 4 25 @ —	
28,000	"	Stove..... 4 97½@ 5 05	
12,000	"	Chestnut. 3 75 @ 4 00	
90,000			

SEPTEMBER 29, 1870.

13,000	tons of Lump...	$4 00 @ —	
12,000	"	Steamer. 4 05 @$4 20	
17,000	"	Broken.. 4 47½@ 4 52½	
10,000	"	Egg..... 4 80 @ 4 90	
26,000	"	Stove ... 5 35 @ 5 42½	
12,000	"	Chestnut. 4 05 @ 4 12½	
90,000			

The following are the averages obtained on each size as furnished us by the company:

Lump,	ranged $3 77½@$3 90	Average,	$3 79		
Steamboat,	do. 3 85 @ 3 87½	Do.	3 85¼		
Grate,	do. 4 07½@ 4 27½	Do.	4 19		
Egg,	do. 4 25 @ 4 25	Do.	4 25		
Stove,	do. 4 97½@ 5 05	Do.	5 03¼		
Chestnut,	do. 3 75 @ 4 00	Do.	3 76		

Sawards Coal Freight Circular gives the following items in regard to the sale:

"The prices realized to-day show an average decline from last month's sale of 29 cents per ton off all sizes. This is cheap coal: it must be much higher next month.

"Lump opened at $3 90, sold down to $3 75, the principal amount being sold at $3 80.

"Steamboat sold at $3 85, with 1,900 tons at the close at $3 87½.

"Broken opened at $4 27½, sold at all the fractions down to $4 07½.

"Egg sold at $4 25 for full amount.

"Stove sold at $5 05, with 1,800 tons at $4 97½, and 8,250 tons at $5 00.

"Chestnut sold at $3 82½ down to $3 75, with 100 tons at $4 00.

"The coal was disposed of in small lots, and in most instances to retailers and consumers."

The *Lehigh Exchange* met yesterday and resolved to retain the October prices for the line trade, and issued the following new prices for November: Lump, $2 25; Broken, $5; Egg, $5; Stove, $5 50; Chestnut, $4 25. This is a reduction of 25c. on Broken, 50c. on Egg, 25c. on Stove, and 25c. on Chestnut.

The Scranton Company have given us the following prices for November, provided they have any coal over and above the amount sold at the auction sale: Lump, $4 25; Steamer, $4 25; Grate; $4 50; Egg, $4 75; Stove, $5 25; Chestnut, $4 25—at Elizabeth.

The Delaware and Hudson Canal Co. have also issued the following prices for November: Lump, $4 25; Steamer, 4 25; Grate, 4 40; Egg at 4 60.

The pioneers, however, in low prices are those issued by the Wilkesbarre Coal and Iron Company, of which we gave notice last week. The coals of this company have long been favorably known among dealers for their uniform good order and careful preparation. The mines and machinery of this company are among the most extensive of any of our large companies, while the veins they are at present at work on are the best known in the region. The Wilkesbarre coal is a clean, free burning, white ash coal, making but little ashes, hence its popularity. The upright and conscientious manner in which the company, through their secretary, Mr. WM. H. TILLINGHAST, and their sole agent, JOHN F. WILSON, conduct their business, has won the respect and confidence of every one. The numerous petty little "tricks of the trade" have always been scorned by this company.

To Messrs. LEWIS AUDENREID & Co. and Messrs. WHITE, FOWLER and SNOW, much credit is also due. These firms are probably the largest contractors for this coal, and have been mainly instrumental in bringing it before the public, and in preserving for it the good name it has always borne.

The Wilkesbarre Coal and Iron Company prices for November are as follows:

Lump	$4 00	Egg	$4 65
Steamer	4 25	Stove	5 25
Broken	4 50	Chestnut	4 00

Delivered on board at Hoboken—25 cents additional alongside at New York. We recommend dealers to take advantage of the above low figures they are, considering the quality of the Wilkesbarre coal, remarkably low.

Messrs. G. B. LINDEMAN & Co. offer their Sugar Loaf Lehigh coal at our quotations.

Mr. SAMUEL BONNELL, Jr., offers Sugar Creek Lehigh at quotations, and the celebrated free burning Wyoming coal at from $4 25 to $5 35.

WHITE, FOWLER & SNOW are receiving large large quantities of Room Run Lehigh coal, which they offer at current rates. This coal has many favorites among dealers, and is largely sold for family use.

RETAIL.—Trade has been very quiet. No new orders. Most of the dealers are employed filling Spring orders, and are making money by the decline in prices.

FREIGHTS.—Vessels are very plentiful, but orders are scarce. Rates, however, remain unchanged.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending October 22, 1870, compared with week ending October 23, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	105,722	2,774,948	95,666	2,468,219
Schuylkill Canal	15,822	535,455	26,681	354,628
Lehigh Valley R. R.	37,594	1,740,126	55,867	2,513,137
Lehigh & Sus. R. R.	29,670	642,958	26,368	839,223
Lehigh Canal	....	583,294	27,927	620,195
Scranton North	18,488	321,171	10,767	603,434
" South	27,837	801,103	40,404	1,431,174
Penn. Coal Co., rail	13,824	784,615	25,021	939,231
" " " canal	357	15,253	112	14,581
Del. & Hud. Canal Co.	32,102	901,331	20,987	1,146,279
" " " R.	4,202	116,135	14,503	397,458
" " south	7,477	88,728	11,061	368,831
Shamokin	14,933	357,455	10,615	390,356
Trevorton	443	25,325		67,374
Lykens Valley Coal Co.	2,215	59,743	1,275	124,371
Wyoming South		247,161		238,824
Wyoming North		53,727		
P. N. Y. C. & R. R. Co.			4,644	246,538
Williamstown, Col'y	4,187	155,377	6,813	243,965
Short Mountain	2,529	87,158		
Big Lick Colliery				
Total	317,197	10,291,056	378,381	12,807,818
1869			317,197	10,291,056
Increase week and year			61,184	2,516,762

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 22, 1870, compared with week ending October 23, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	20,000	807,000	26,646	812,995
C. & O. Canal	15,000	504,000	9,916	492,662
H. & B. T. R. R.	6,919	288,928	....	568,145
Harrisburg & D.	11,863	....	15,092	623,847
L. V. R. R.	....	552	1,270	12,213
P. & N. Y. C. & R. Co.	....	....	6,847	211,866
	53,782	1,600,480	59,771	2,727,728

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Oct. 20, 1870:

From St. Clair	37,040 08
" Port Carbon	7,208 13
" Pottsville	4,927 19
" Schuylkill Haven	24,773 00
" Auburn	5,882 10
" Port Clinton	15,703 13
" Allentown and Alburtis	130 14
" Harrisburgh and Dauphin	15,092 09
Total paying freight	110,759 06
Coal for Company's use	4,152 09
Total for week	114,911 15
Previously this year	3,030,622 11
Total	3,145,534 06
To same time last year	3,530,126 16

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, October 20, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	25,662 10
" Port Clinton	1,019 00
Total for week	26,681 10
Previously this year	327,946 10
Total	354,628 00
To same time last year	535,455 00

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, October 22, 1870 6,913 01

Same time last year 4,187 18

Increase, Tons 2,725 03

Total amount shipped to date 243,965 17

Same time last year 155,377 05

Increase, Tons 88,588 12

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending October 22, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons cwt	WEEK, 1869. tons cwt	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	31432 01	18684 01	992177 13	643828 02
Upper Lehigh Region	3553 18		122892 01	77288 03
Mahanoy Region	193 04		1928 10	2531 01
Hazleton Region	8812 03	202 10	269458 10	121452 15
Beaver Meadow Region	2854 04		121925 03	93839 11
Mauch Chunk Region	12287 15	11907 08	156263 04	36840 16
Totals	59128 03	30793 19	1655645 01	1275580 08
Increase	28334 04		380064 13	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	26008 03	29870 00	839223 15	642958 16
Forwarded East of Mch Chunk by Canal	27827 09		620195 04	583284 04
Delivered at and above Mauch Chunk	945 10	522 03	35517 00	27532 00
Delivered to L. & B. R. R. at Plymouth Bridge	4347 01	471 16	160709 02	16654 05
L. V. R. R. at Sugar N.				5151 03
Totals	59128 03	30793 19	1655645 01	1275580 08
Of the above there was transported on account of L. C. & N. Co.	14342 09	12935 08	189374 11	361773 16
W.-B. C. & I. Co.	18033 04	8315 01	484309 19	329292 12
Totals	32375 13	21280 12	673684 10	685066 08
Increase	11095 01			
Decrease			11381 18	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Oct. 22, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	25,021 15	939,231 10	13,828 02	784,616 00
" Canal	112 03	14,581 19	357 16	15,253 17
Total	25,133 18	953,813 03	14,185 18	799,869 17

Increase, 1870, 152,943 12 tons.

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Oct. 20, 1870:

	Tons.
For week	15,092 09
Previously this year	614,755 09
Total	629,847 18
Same week last year	11,993 14

Report of Coal Transported over Lehigh Valley Railroad

For the week ending October 22, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	11,539 07	511,622 19	523,162 06
" Hazleton	40,241 15	1,748 146 16	1,788,388 11
" Upper Lehigh	93 11	11,367 06	11,482 17
" Beaver Meadow	12,767 12	616,965 01	632,722 13
" Mahanoy	7,991 12	235,103 02	243,094 14
" Mauch Chunk	180 24	1,056 11	1,237 05
Total Anthracite	72,806 01	3,127,271 15	3,200,077 16
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.	1,270 00	10,943 00	12,213 00
P. & N. Y. C. & R. R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	74,076 01	3,138,214 15	3,212,290 16
Same time last year	38,075 12	1,976,124 04	2,014,199 16
Increase	36,000 09	1,162,090 11	1,198,091 00
Decrease			
Forwarded East from M'h Chunk by rail	55,876 06	2,457,261 04	2,513,137 10
Same time last year	37,094 07	1,703,032 01	1,740,126 08
Increase	18,781 19	754,229 03	773,011 02
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	55,876 06	2,457,261 04	2,513,137 10
To N. C. R. R., at Mount Carmel	53 10	3,266 19	3,320 09
Forwarded North from L. & B. Junction	4,626 02	241,385 15	246,011 17
To L. & S. R. R. at Packerton for rail	268 13	7,056 17	7,325 10
Delivered at M'h Chunk	130 04	1,061 02	1,191 06
Delivered on line of road above Mauch Chunk	184 03	8,891 19	9,076 02
Delivered above M. Chunk for use of L. V. R. R.	697 05	45,289 01	45,986 06
To L. & S. R. R., at P'n Hav., for railroad	8,074 10	243,538 05	251,612 15
Do. for canal	2,895 08	119,520 13	122,416 01
At M.Chunk for canal			
Total Anthracite	72,806 01	3,127,271 15	3,200,077 16
Bituminous Coal	1,270 03	10,943 00	12,213 00
Total all kinds	74,076 01	3,138,214 15	3,212,290 16

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending Oct. 22, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	4,644 02	241,894 01	246,538 03
Bituminous	3,847 00	205,019 00	211,866 00
Total, Ant. and Bit.	11,491 02	446,913 01	458,404 03

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, October 22, 1870.

	WEEK.	SEASON.
North	31,219 08	1,720,640 16
South	11,961 08	368,830 12
Total	42,271 16	2,089,461 08
CORRESPONDING TIME IN 1869:		
North	46,643 16	1,017,882 01
South	7,477 05	87,012 03
Total	54,121 01	1,104,894 04
Decrease North	15,433 08	Inc. 702,748 15
Increase South	3,584 03	Inc. 287,818 05
Total Decrease	11,849 05	Inc. 984,567 04

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending October 22, 1870.

	WEEK.	SEASON.
By Del. and Hud Canal	20,987 00	1,146 279 00
By Railroad	14,533 00	397,458 00
South	11,061 00	368,831 00
Total	46,581 00	1,912,568 00
Corresponding time in 1869.		
By Del. and Hud. Canal	32,102 00	901,331 00
By Railroad	4,202 00	116,135 00
South	7,477 00	88,728 00
Total	43,781 00	1,106,194 00
Increase	806,374 00	

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, October 22, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	10,767 09	603,434 10
Shipped South	40,404 06	1,431,774 12
Total	51,171 15	2,034,669 02
For the corresponding time last year.		
Shipped North	18,488 06	321,171 08
Shipped South	27,837 09	801,103 11
Total	46 325 15	1,122,274 19
Increase	4,846 00	911,794 03
Decrease		

Shipments of Cumberland Coal

for the week ending Saturday, October 22, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	2,347 01	957 05	3,304 06
Consolidation	5,345 13	2,338 12	7,684 05
Spruce Hill	447 02	.....	447 02
Midlothian	188 10	344 15	533 00
H. and Baltimore	88 03	707 16	795 19
do Va M	1,751 11	.....	1,751 11
V C & I Co	619 09	.....	619 09
G. C. C. and I.	1,036 14	.....	1,036 14
Maryland	3,400 17	3,705 03	7,106 00
American	1,676 14	1,862 17	3,539 11
Atlantic	652 02	.....	652 02
Piedmont	2,008 15	.....	2,008 15
Swanton	1,139 19	.....	1,139 19
Barton	712 00	.....	712 00
Potomac	1,318 10	.....	1,318 10
Franklin	1,576 10	.....	1,576 10
George's Creek M. C.	657 07	.....	657 07
Big Vein	1,679 06	.....	1,679 06
Total week	26,646 03	9,916 08	36,562 11
Previous	786,349 14	482,746 05	1,269,095 19
Total year	812,995 17	492 662 13	1,305,658 10

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, November 1.		AT PHILADELPHIA, November 1.	
SCHUYLKILL.	R. A.	W. A.	R. A.	W. A.
Lump	$—	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 50 to 6 00	5 25 to 5 50	— —	4 50 to 4 75
Stove	5 50 to 6 00	5 75 6 00	— —	4 50 to 4 75
Chestnut	4 00 to 4 50	4 00 4 25	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 60	— —	— —	— —
Broken	5 35	— —	— —	— —
Egg	5 35	— —	— —	— —
Stove	5 85	— —	— —	— —
Chestnut	4 60	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 25	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	6 00	— —	— —
Honey Brook, Le'h	W. A.	4 25 to 5 25	— —	— —
Spring Mountain	" "	4 25 to 5 25	— —	— —
Sugar Creek	" "	4 25 to 5 25	— —	— —
Sugar Loaf	" "	4 25 to 5 25	— —	— —
Old Comp'y's	" "	4 25 to 5 25	— —	— —
Cross Creek	" "	4 25 to 5 25	— —	— —
Room Run	" "	— —	— —	— —
Girardville	" "	— —	— —	4 75
McMichael	" "	— —	— —	4 75
Shamokin	" "	5 50	5 25	— —
Lykens Valley	" "	— —	5 75	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 75	— —
Henry Clay	" "	— —	5 00	— —
Powelton	" "	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

November 1870.

	F.L. Bro.	Gra.	Eg.	Sto.	Chest.
Lehigh	$3 00	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein	f.o.b. at Phila.		$5 00
"	Lemon	" "	4 75
Cumberland Vein Coal			4 75
Cumberland C. & L. Co.'s on board		N. Y.	7 00
Maryland Coal Co.	"	"	7 00
Consolidated Coal Co.'s	"	"	7 00

Company Coals.

November, 1870.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 25	4 50	4 50	5 25	4 25
Pittston at Newburgh	4 30	4 30	4 50	4 60	4 90	4 20
Lackawana at Rondout	4 25	4 25	4 40	4 60	5 10	4 30
Wilk'b're at Hoboken	4 60	4 25	4 50	4 65	5 25	4 50
Old Co. Lehigh at Pt. Johnston	5 25	5 00	5 00	5 50	4 25	— —
Lehigh at E. Port	5 25	— —	5 00	5 00	5 50	4 25

For freights to different points, see "Freights."

Prices at Baltimore—November, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@— —
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs.	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

November, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

November, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@- 75
Gowrie	1 75	@- 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 75	@- 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse. Currency.	Slack
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton $7 80

Prices of Foreign Coals.

November, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	15 00@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry,	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 15
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 31

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. &	81
R. & D. R. R.	1 09
Cam. & Am. R. R.	
Shipping Expenses,	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 15
Shipping expenses	25
Wharfage	10
Total	$2 45

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris "	2 10
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 05
Freight	
	2 45
For re-shipment	2 10

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	50
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	50
Delaware and Raritan Canal	35
Freight	1 00
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40

	Per Boat.
Greenwich,	$70 00
Port Chester,	80 00
Mamaroneck,	70 00
Glen Cove,	60 00
New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	20 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS Boats of 150—250 Tons.	Per Ton.
To Manhattanville,	8 cents
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Croton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	23 "
Boats of 100 Tons	Per Boat
To Manhattanville, and Return,	$11 00
Spuyten Duvvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

Freights.—NOVEMBER, 1870.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnson.	From Newburg...	From Rondout....
Amesbury	$2 50	$2 00	$	$
Bangor	2 30	1 60	1 60	
Bath	2 30	1 75	— —	
Boston	2 30	1 75	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 35	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 00		
Fall River	2 50	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 35	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 50	1 85		
New Haven	1 90	1 00	1 10	1 20
New London	2 00	1 25	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 25	1 50		
Portsmouth, N. H.	2 25	1 85		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 25	1 65	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	1 75		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	— —	60
Catskill		— —	— —	50
Cocksackie		— —	— —	50
Coeyman's		— —	— —	75
Cold Spring		— —	— —	35
Fishkill		— —	— —	30
Haverstraw		50	— —	60
Hudson		— —	— —	50
New York		— —	— —	70
Nyack		60	— —	60
Poughkeepsie		— —	— —	35
Rhinebeck		— —	— —	30
Rondout		— —	— —	— —
Saugerties		— —	— —	40
Sing Sing		— —	— —	75
Stuyvesant		— —	— —	55
Tarrytown		80	— —	75
Troy		90	— —	75
West Point		— —	— —	35
Yonkers		40	— —	60

Foreign and Provincial Freights.
November, 1870.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-5 tons.....£14 00@£16 00
Liverpool, 5 per cent primage.....13s. @16. ton

TO NEW YORK.

Provincial
Sidney.....$—
Lingan.....—
Cow Bay.....—
Port Caledonia.....—
Little Glace Bay.....—

TO BOSTON.

Sydney.....$—
Lingan.....—
Cow Bay.....—
Port Caledonia.....—
Little Glace Bay.....—

METALS.

NEW YORK, October 29, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	32 00@36 00
Pig, American, No. 1	32 00@— —
Pig, American, No. 2	31 00@— —
Pig, American, Forge	27 00@28 00
Bar, Refined, English and American	75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ℔ ct.	—@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@— —
Horse Shoe " "	95 —@— —
Rods, ¼ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ℔ ct.	— 7@— 7½
Sheet, Russia, as to Nos. (gold)	11 @—11½
Sheet, Single, D. and T. Common	—4¾@— 6

Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14

Rails, English (gold), ℔ ton	57 00	@59 00
Rails, American, at Works in Pa.	70 00	@71 00

STEEL.—Duty: Bars and Ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 centsore lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (St prices.)

English Cast (2d and 1st quality) ℔ lb	— 15	@— 18
English Spring (2d and 1st quality)	— 7	@— 10
English Blister (2d and 1st quality)	— 10	@— 17
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— —	@— 17
American, Spring, do.	— 9	@— 11
American Machinery, do.	— —	@— 12
American German, do.	— 9	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	— @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	— @— 21¾
Yellow Metal, New Sheating	— @— 32
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1¼ cents ℔ lb; Pipe and Sheet, 2¼ cents ℔ lb.

Galena, ℔ 100 lbs.	$— —	@— —
Spanish (gold)	6 30	@6 35
German, do.	6 30	@6 35
English, do.	6 30	@6 62½
Bar (net)	7 50	@— —
Pipe (net)	7 50	@— —
Sheet	8 00	@— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	32½@36
Straits	31½@33
English	— @32

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$8 25 @8 87½	$9 75 @10 25
I. C. Coke	7 25 @8 —	8 50 @ 9 50
Coke Terne	5 65 @6 75	6 75 @ 7 75
Charcoal Terne	7 50 @8 —	9 00 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100lb Gold.]

Plates, Foreign	℔ 100 lbs. $6 00 @ 6 12½
Plates, Domestic	℔ lb. 7 1-12@— 11½

REMARKS.

IRON.—The market for Scotch Pig remains quiet. The demand is principally for small parcels, but as the receipts continue light, prices are unchanged; 100 tons Eglinton from yard sold at $33, and 125 do. ex ship, on private terms. The demand for American has subsided, and prices are not very steady. There has been very little enquiry for either new or old Rails, but prices are very firm at the quotations previously noted. Refined Bar from store remains without animation; we quote nominally $80 @ $85 per ton.

LEAD.—The demand for Pig continues very light, and we have only to notice the sale of 50 tons Spanish at $6 35 gold. Bar, 7½c.; Pipe, 7½c.; and Sheet, 8c.

TIN.—Pig is without demand, and though offered at easier prices, buyers do not respond; we quote Straits nominally 32½c. @ 33c., Banca 36c., and English 37½c. @ 32c., all gold. Plates, too, have become very dull, though prices are without quotable change. We have only to notice sales of 350 boxes Charcoal Terne at $7 50 @ $7 62½ gold, and 200 do. Bright at a private price.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. Ingot continues in fair demand, and prices remain firm, the tendency being rather in buyers' favor. The transactions embrace about 500,000 lbs. Lake at 21½c. @ 21¾c., and 100,000 lbs. Quincy, 22c. cash.

SPELTER.—Foreign remains very dull, and we have only to notice the sale of 10 tons Silesian at 6½c. gold. Domestic is steady, and is rapidly taking the place of the Foreign article; 20 tons Missouri Zinc Co. sold at a private price.

STEEL.—There is no change to notice in quotations; business moderate.

ZINC.—Dry American, 6½ @ 7c.; French do., 10 @ 11c.; Metallic do., 9½ @ 10c.

MANGANESE—4 @ 4½c. per lb.

Mining Stocks.

NEW YORK, Oct. 28, 1870.

Mining Stocks, without exception, are lower. No transactions are reported. Operations in the Board, judging from their results, are merely nominal. Below is the report in full.

	Bid.	Asked.
Benton Go'd	3	5
Black Hawk Gold	25	35
Central Gold	15	16
Consolidated Gregory	60	75
Grass Valley	25	28
La Crosse Gold	8	10
Quartz Hill	18	20
Smith & Parmelee Gold	50	70

PETROLEUM.—With the exception of Central and Home Petroleum, which have decidedly advanced, all stocks on the list are lower than per previous report. We hear of no sales, and it would be a matter of decided satisfaction to us if we could trace the cause of this almost constant inactivity. Certainly the supply of Oil and the demand for it is as great as ever, and yet scarcely a transaction in Oil Stocks occurs once in a week. Probably some of our friends at the Board can enlighten us on the subject. Below is a comparative table of quotations for this and the week previous:

	Oct. 20. Bid.	Oct. 20. Asked.	Oct. 27. Bid.	Oct. 27. Asked.
Blivin Oil	—	—	40	—
Bennehoff	25	40	—	—
Bergen Coal and Oil	—	40	—	40
Blood Farm	—	—	—	—
Brevoort	50	—	50	—
Buchanan Farm	35	—	40	70
Central	63	—	66	—
Home Petroleum	1 75	—	1 95	2 50
N. Y. and Alleghany	1 75	—	—	—
National	10	—	—	—
Northern Light	—	75	—	—
Phillips' Pet.	15	25	—	—
Pithole Creek	1 00	1 60	50	1 10
Rathbone	—	40	—	—
Rynd Farm	28	—	28	—
Second National	—	75	—	—
United Petroleum Farms	19	20	19	21
United States	60	75	60	2 70

San Francisco Stock Market.

All of the Stocks on the Comstock list have declined, with the exception of Chollar Potosi, which has slightly advanced. Our report per telegraph dates October 27. Below is a comparative table of quotations.

(By Telegraph.)

PER SHARE.	Oct. 18.	Oct. 27
Savage	37½	32½
Yellow Jacket	29½	34½
Kentuck	31½	37
Chollar Potosi	59½	65
Gould & Curry	101	88½
Belcher	47½	No sales
Imperial	No sales	"
Ama or	242½	245
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Hale & Norcross	—	—
Empire Mill	—	—

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	..	$6 50@	7 00
" green, 1st " "	..	6 50@	7 00
" red, 1st " "	..	15 00@	16 00
" variegated, " "	..	5 75@	6 25
Pa. b'k and d'k blue, 1st qual., "	..	6 00@	7 00

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending October 22, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co.	290	5,265	5,555
New York Slate Co.	....	2,950	2,950
Middle Granville Slate Co.	1	51	5,122
*American Slate Co.	....	....	....
Benj. Williams	60	1,128	1,188
Jones & Williams	....	70	70
Eagle Slate Co.	....	153	153
H. W. Hughes		176	176
J. D. Jones		35	35
Total	350	10,289	10,639

*Penrhyn and American Co.'s shipments are consolidated for this season.

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co.	.....	.....	.....
Penrhyn Slate Co.	22	1,707	1,729

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co. cars	1	18	19
Penrhyn Slate Co. "			

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. R. R., FOR THE WEEK ENDING OCTOBER 22, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co. sqs.	120	605	725
Western Vermont Slate Co		26	26
Blue Slate Co.	52	440	492
The Evergreen Slate Co.	40	4400	4440
Forest Mining Slate Co.	120	80	200
West Castleton Slate Co.	..	90	90
E. D. Billings	..	137	137
R. M. Copeland	16	127	143
W. E. Williams	..	80	80
Total	348	5985	6333

MILL STOCK.

Eagle Slate Co. cas.	82	..
Western Vermont, car	1½	..

FINISHED MANTELS.

West Castleton Slate Co. box.	90	324	414
Forest Mining "	9	173	173
Total	99	497	606

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co. box.	..	72	72
West Castleton Slate Co.	132	479	611
Western Vermont	..	31	31
Total	132	582	714

TILE.

Eagle Slate Co. box.	72	1577	1649

The Dowlais Iron Works.

THERE are two things for which an iron-master visiting the Dowlais works cannot help envying its proprietors: these are, the "smokeless coal," and the managership of Mr. W. MENELAUS. In naming these two principal elements of success, we believe we have done justice to the general characteristics of the Dowlais works, and we may proceed, without further remarks upon that establishment as a whole, to describe some interesting details which presented themselves to our notice at the recent visit of the Iron and Steel Institute to the Dowlais Iron Works. We commence with the Bessemer process. There are six converters placed in a straight line in one large and well-designed building. The blowing engines are of the ordinary type of horizontal engines first designed by Mr. BESSEMER. The pig-iron is melted in air-furnaces, and an unusually rich spiegeleisen is selected and employed for "tempering" the steel. The charge made in the presence of the members of the Iron and Steel Institute can scarcely have been a fair representation of the every-day practice at these works. The workmen, probably from a desire "to show off the fireworks," charged a quantity of spiegeleisen into the converter, which made the iron work irregularly, and rendered the charge difficult to control. The consequence was, that upon the minds of the more experienced spectator the charge made the impression of being badly managed, while the impression upon those less intimately acquainted with the Bessemer process lacked that characteristic of beautiful order and easy control which is one of the most striking points of the Bessemer process. Fortunately for those members of the Iron and Steel Institute, there was another charge made on the following day at Ebbw Vale, which may properly be described as a model charge in every respect, and which must have given more than usual satisfaction to Mr. BESSEMER himself, who was a conspicuous spectator at the great display. The Bessemer works at Dowlais are now being supplemented by a pair of Siemens-Martin furnaces, an addition which will in all probability prove highly useful, and will before long be employed also in many other great Bessemer steel works in this country. The mechanical appliances for cogging ingots and rolling rails we propose describing at a future more suitable occasion.

We now pass to another novelty which was exhibited at Dowlais, namely, the Ellershausen process. On page 21 of our last volume we published particulars of this American process, and illustrated the plant employed. The Dowlais works have made arrangements for putting this new process to a practical test under the personal superintendence of Mr. THOMAS S. BLAIR, the representative of Mr. ELLERSHAUSEN in this country. The *rationale* of the Ellershausen process is almost identical with that adopted by Mr. C. W. SIEMENS in his method of puddling by means of a neutral flame, and which was first publicly discussed at the meeting of the British Association at Dundee, in 1868. Mr. ELLERSHAUSEN, like Mr. SIEMENS, desires to avoid the necessity of employing free oxygen from the atmospheric air for the purpose of decarburizing and desilicatizing pig-iron, and he tries to abstract the required oxygen from iron ores, which by their decomposition yield a quantity of metallic iron in addition to that which originally forms the bath. So far the theory, or, rather, the intention of the Ellershausen process, is very satisfactory, but the means for carrying out this intention are not equally free from reproach.

Mr. ELLERSHAUSEN mixes the liquid pig-iron as it is tapped from the blast furnace with a quantity of rich iron ore. The ore is reduced to a fine powder of uniform grain, and it is intimately mixed with the liquid iron by charging alternate layers of liquid iron and of powdered ore into a series of boxes which are set round the circumference of a large turn-table or revolving disc. The result of this mode of charging is the production of a kind of concrete mass of iron and iron ore which can be subsequently submitted to further treatment in the manufacture of refined iron, and which contains the elements required for the decarburization of the pig-iron on the one hand, and for the reduction of the ore on the other hand. The conglomerate of ore and iron, or the "Ellershausen sandwiches," as these masses are occasionally called, are therefore no refined product as such, but only a mechanical mixture of materials which in a subsequent process ought to react upon each other in such a manner as to produce malleable iron. In charging the conglomerate into an ordinary puddling furnace, for instance, it is expected that the iron will "come to nature" very rapidly, and without the exertion of any mechanical labor. It may also be expected that this conglomerate, if exposed to the steel melting temperature of a Siemens furnace, will, without further working, reduce itself into a bath of liquid steel, or liquid malleable iron. The conglomerate, if made of pure pig-iron and pure iron ore, might also be employed for charging into the bath of pig-iron in the Siemens-Martin process.

Of all the above possibilities, none have as yet been realized in practice. The difficulties which present themselves under the actual conditions of work carried on upon a large scale are very considerable. It is not possible to select materials so as to be under perfect control, and properly proportioned to each other in quantities and qualities of all the different elements and compounds which must be simultaneously acted upon in order to produce the desired result. The temperature of the liquid iron is not favorable to the reduction of the powdered ore, and the presence of a considerable quantity of silica which will be found in the majority of the richer iron ores in this country will materially affect the wished-for results in the subsequent processes, and it is more than probable that the ultimate results will be the production of a large amount of black cinder or slag, being a rich silicate of iron, and containing probably all the iron belonging to the ore, and some further addition of iron which must have been abstracted from the pig-iron itself in a complicated manner. There will in all probability be a remainder of metal more or less refined, and capable of being hammered and rolled with more or less favorable results as far as the quality of the product is concerned. But this does not go far to establish the value of the process in practice. The Ellershausen process, even in its abstract *rationale*, has only one standing point, and that is economy of working due to a diminution of labor, and an increased yield as compared with the ordinary process of puddling. In cheapening the production of the lower qualities of wrought-iron, this process would have found a wide field of application in the immediate future, and perhaps for some considerable time to come. This, however, there seems to be but little hope for, as far as we can see at present. Mr. BLAIR and his collaborators seem hardly to be sufficiently aware of the great enemy which they have to contend against in the two components of their raw materials, namely, the silica in their ore and the silicium in their pig-iron, otherwise they would perhaps have selected their materials differently from what they appear to have done at Dowlais, where the last experiment was made in the presence of the members of the Iron and Steel Institute. In any case the process is still in its first stages of experimental progress, and cannot aspire to be ranked among the practical realities of iron metallurgy, so far, at least, as its application in this country is concerned.—*Engineering.*

Electric Time Signals.*

A Description of the Electric Time Signal at Port Elizabeth, Cape of Good Hope. By ALFRED VARLEY, Assoc. Inst. C.E.

THE progress made in the application of electricity to time signalling has been brought under the consideration of this section at more than one meeting of this association. In the year 1850, the Astronomer-Royal applied electricity to time signalling. In 1854, the British Association met at Liverpool, and in that same year a time-ball, acting in sympathy with the Greenwich Observatory ball, was erected in Liverpool. It so happened the author at that period had the charge of the telegraphs belonging to the Electric Telegraph Company, in the Liverpool district, under Mr. CULLEY, now the engineer-in-chief of the postal telegraphs, and the immediate superintendence of the Liverpool time-ball fell to his charge.

The discharging a time-ball weighing 4 cwt. by electricity, from a distance of over 200 miles, was the greatest feat of its kind up to that time. The circumstance of the British Association again meeting at Liverpool, has suggested to the author that a description of the time-ball erected at Port Elizabeth for the benefit of the shipping in Algao Bay, and which is daily discharged from the Royal Observatory in Cape Town, a distance of 500 miles, would be of interest to the Association.

This time ball is discharged by a through current from Cape Town—that is to say, there is no relay or intermediate apparatus between the Observatory and Port Elizabeth, the trigger being discharged by the galvanic battery at the Observatory. There are some points of interest connected with the Liverpool time-ball which have not been published, and a brief description of the signal may be useful; but the subject of time balls having been before this association on former occasions, it is scarcely necessary to enter into lengthy details. The Liverpool time-ball, which was made of zinc, and weighed 4 cwt., was attached to a strong iron rack, on the lower end of which there was a piston, and when the ball was discharged, after it had passed through a clear space of two feet, the piston entered a cylinder, compressing the air in its descent; the compressed air formed a cushion to receive the ball, and was allowed to escape through a tap fixed into the lower portion of the cylinder; this enabled the rate at which the air escaped, and the rate of the final descent of the ball, to be regulated. The ball was raised by means of a pinion working in the rack, and when wound up, and the pinion thrown out of gear, the piston rested upon a strong steel detent, the other end of which rested against a friction roller fitted into one end of a right angular lever. The pressure exerted on the right angular lever was entirely vertical. A second lever pressed against the underside of the lever, and on this second lever a hammer impigned. Attached to the axle upon which the hammer worked there was a lever having a friction roller which rested against a horizontal plane of polished steel fixed to a vertical lever, which worked on a pivot at its lower end. A long, light lever, mounted upon a delicate axle, and having a curved arm projecting on the other side of the axle, rested upon the top of a lever, to the lower end of which was attached a soft iron armature.

The armature was retained a short distance from the poles of an electro-magnet, by means of a delicate spring, and when the electro-magnet was rendered active by closing the electric circuit through it, the armature was attracted, the lever fell, knocking away the vertical lever, liberating the hammer, the impact of which on the lever, acted upon the right angular lever, released the detent, liberating the ball, which fell by its own gravity. The hammer and the other levers were actuated by springs, to make their action more rapid. The trigger and the general arrangements of the time ball were carried out under the superintendence of Mr. LATIMER CLARK. The electrical arrangements were as follows: The Greenwich Observatory clock closed an electric circuit at 1 P. M. This current discharged a time-ball on the top of the telegraph office in the Strand, and entered the earth at the chief London telegraph office, after passing through an apparatus designated by Mr. CULLEY, and termed the automaton, as it automatically closed several electric circuits, and relaid time currents from batteries in the London office to Liverpool, Manchester, and other chief towns. Shortly after the time-ball at Liverpool had been got to work it was thought advisable to make some alterations in the trigger, and it was sent to Manchester to be altered, but after this had been done it was lost in its transit from Manchester to Liverpool, and a new one had to be constructed. This second trigger was made at the Telegraph Company's stores in Manchester, under Mr. CULLEY'S superintendence, and some improvements were effected in its construction. The only thing which had to be done at Liverpool was to wind up the ball, adjust the trigger, and wait for the time current, which discharged the ball at one o'clock.

The author soon felt it was very desirable there should be some check by which the Electric Telegraph Company could ascertain that the apparatus in their offices were working correctly, and he suggested arrangements for effecting this, and he also proposed a means of measuring the loss of time between receiving the Greenwich current in London and the falling of the time ball at Liverpool, for there necessarily was a loss of time, and it was desirable to ascertain the amount.

The elements of loss of time were:

1. The automaton occupied a small interval in closing the circuits after the current had arrived from Greenwich.

2. The time current was sent to Liverpool by an underground circuit, and an appreciable interval of time elapsed between the current leaving London and arriving at Liverpool.

3. The trigger occupied time, discharging one lever after another.

The arrangements suggested and carried out were:

1. The hammer of the trigger, after liberating the detent upon which the ball hung, was made to divide the circuit so that electrical communication was broken by the apparatus itself immediately after its discharge, and at the same time that the circuit was divided the trigger hammer connected batteries at Liverpool on to a second wire, and sent a return current to London. The Liverpool time wire passes through the Manchester telegraph office, to which a time current was also sent at one o'clock, and advantage was taken of this to obtain an additional check. Two galvanometers were placed in the chief telegraph office in London, side by side; one of these was placed in the Greenwich time wire, the other in the return circuit from Liverpool. In the Manchester office two galvanometers, side by side, were placed, one in the circuit of the Liverpool time wire, the other in the Manchester time wire. In Liverpool the time wire was also connected through a galvanometer as well as the trigger. An observer in London noted the receipt of the Greenwich current, and the interval of time elapsing before receiving the return current from Liverpool. An observer at Manchester noticed the simultaneous arrival of the time currents on the Manchester and Liverpool circuits, and the rapid cessation of the current on the Liverpool circuit consequent upon the dividing of the circuit by the trigger. An observer at Liverpool also noticed the reception of the current and its rapid cessation, indicating there was no hanging fire on the part of the apparatus at Liverpool. In this way a very complete check was obtained, and the galvanometers in the Liverpool circuit at Manchester and Liverpool, in practice only swung over a space of fifteen or twenty degrees, instead of being permanently deflected, which they would have been if the apparatus had hung fire.

The interval elapsing between the receipt of the current from Greenwich in London and the discharge of the ball in Liverpool was 11-20ths of a second. Of this time 5-20ths of a second were occupied by the current travelling through the underground wire between London and Liverpool; 2-20ths of a fraction were consumed in the automaton, and 4-20ths+a fraction in the trigger.

The author constructed an electric chronograph to enable him to measure small intervals of time, making use of a Bain's telegraph machine for the purpose.

A Bain's telegraph consists of a train of wheels regulated by a fly, and driven by a weight.

A metal drum connected with the train communicates motion to a ribbon of paper prepared with ferro-cyanide of potassium and nitrate of ammonia.

When the machine was started the ribbons of paper passed over the drum at the rate of 6 ft. per second.

A piece of fine steel wire insulated from the drum pressed lightly upon the prepared paper, and the circuit was closed through the steel wire, the prepared paper, and the metal drum.

When the circuit was closed the ferro-cyanide of potassium was decomposed, the cyanogen combining with the wire forming prussian-blue, and as the paper was in motion a blue line was formed on it as long as the circuit was closed. This machine gave the means of measuring time in space, and the way in which the author measured the loss of time in the trigger, for instance, was as follows: He placed the Bain's machine in circuit with the trigger, making the trigger to divide the circuit after discharge, as already described. The machine was started by the pendulum of a regulator, or the seconds-hand of a watch, and the electric circuit was closed by means of a contact maker. The electric circuit remained closed until the circuit was divided by the trigger recording a blue line on the paper. The paper was usually allowed to run until one minute was completed, and then stopped. The length of paper run out was then accurately measured, and also the length of the blue line, and from these two measurements the interval of time could be exactly determined.

In the year 1859 Sir THOMAS MACLEAR, the Astronomer-Royal of the Cape of Good Hope, inspected the electrical time signals in this country with a view to erecting time balls in connection with the Royal Observatory at Cape Town, and he remarked the greater rapidity of action of the Liverpool trigger, and this led to the author afterwards designing and constructing at different times two triggers for use in the cape. Both these triggers discharged more rapidly than the Liverpool trigger. In September, 1864, the author was requested to construct a trigger for discharging a time ball to be erected at Port Elizabeth. The auther considered the intervention of any relay or secondary apparatus to be objectionable. He therefore determined, if possible, to construct the trigger sensitive enough to be discharged by the batteries in the Cape Town Observatory, and in its construction he adopted a modification of a principle first introduced by Professor HUGHES in his printing telegraph, described at the Newcastle meeting. The trigger was constructed with a soft iron armature, rendered magnetic by induction from a powerful compound bar-magnet, and strongly attracted the soft iron cores of an electro-magnet. A spiral spring attached to this armature was so adjusted that it nearly overcame the magnetic attraction induced by the bar-magnet. The time current polarized the electro-magnet in the opposite direction to that induced by the bar-magnets; and as the attraction between the armature and the soft iron cores was already almost overcome by the spiral spring a very small amount of polarization in the opposite direction was necessary to release the armature, which was rapidly pulled away by the spiral spring, and the trigger discharged.

There were some other alterations made in the general mechanical construction of this trigger, but they may be regarded as matters of detail. The rapidity of discharge was very great—one-twentieth part of a second only elapsed between the arrival of the time current and the falling of the ball.

From a report in the Port Elizabeth paper of August 29, 1865, giving an account of the inauguration of this time signal, and forwarded to the author by Sir THOMAS MACLEAR, it appears that the time elapsing between the time current leaving the Observatory at Cape Town and the receipt at Cape Town of the signal announcing the falling of the ball is only one-fifteenth part of a second. The time which elapsed between the Greenwich current reaching London and the falling of the ball at Liverpool was eleven-twentieths of a second. In other words, the Algoa ball is discharged a distance of 500 miles in less than one-seventh of the time of that of the Liverpool ball. What is being daily done in the Cape can, however, be best summed up by a short quotation from a letter the author received from Sir THOMAS MACLEAR giving an account of the successful inauguration of this time signal.

After detailing the general arrangements, Sir THOMAS MACLEAR goes on to state: "A few tentative signals having proved satisfactory, the 'preface' was issued from the Observatory at ten minutes before one o'clock, and at the instant of one o'clock the Observatory time ball clock closed the circuit discharging the Observatory ball, the Simon's town ball, twenty-four miles distant, the Cape Town time gun three miles distant, and the Porth Elizabeth ball, distant 500 miles!"

* Paper read before Section A of the British Association, at Liverpool.

Nils Ericsson.

IT is with great regret we notice in the Swedish *Aftonbladet* of the 8th ult. an announcement of the death of NILS ERICSSON, the greatest engineer Sweden ever possessed. NILS ERICSSON, who was born in the year 1802, was the son of OLAF ERICSSON, an ironmaster of Langbanshyttan, and he was the elder brother of Captain JOHN ERICSSON, the celebrated engineer, who has achieved so great a name on both sides of the Atlantic. During his lifetime NILS ERICSSON received many honors at the hands of his Government; but it is not for these, but for his labors to promote the prosperity of his country, that his name will be remembered by the people of Sweden. It was to his skill and energy that the construction of the system of State railways in Sweden was mainly due, and amongst the many important works carried out by him we may mention the reconstruction of the celebrated Trollhätte canal, the docks at Stockholm, and the canal between Saimen and the Gulf of Finland.—*Engineering.*

The American Institute of Architects.

FOURTH ANNUAL CONVENTION.

The approaching Convention of the Institute, which we announced in our last week's issue, to be held in Philadelphia on the 8th and 9th of November, will take place in the rooms of the Philadelphia Chapter in the Athenæum Library building, on Washington square in that city. The annual address will be delivered by THOMAS U. WALTER, Esq., Vice-President of the Institute and President of the Philadelphia Chapter. The closing address will be delivered by the Rev. WM. H. FURNESS, D.D., of Philadelphia, on the evening of November 9th.

ON DIT ABOUT MINES AND METALS.

Gaize is the local name of a variety or form of native hydrated silicic acid, or silica, occurring in the department of Ardennes, France, to which more particular attention has recently been called by Sainte-Claire Deville, who suggests its employment as a refractory material for the manufacture of fire-bricks and crucibles. As its locality is found just below the cretaceous formation, in a layer of nearly one hundred feet thickness, which extends over a distance of more than twenty-five miles. Analysis shows it to have the following centessimal composition: Hygometrical water, 3.4; water of combination, 3.2; soluble silica, 43.7; insoluble silici, 40.8; alumni, 3.8; ferric oxide, 2.9; lime, 0.9. The stone is used to some extent for building purposes. Deville, however, found that it resists a very high temperature without fusing or cracking, as well as without perceptible contraction, either cubical or linear, and hence recommends it for the purposes above indicated, and for uses in the construction of furnaces. Specimens of crucibles (made on the lathe) and of fire-bricks of this material were exhibited at a recent meeting of the French Academy of the Sciences, and the attention of that learned body called to its valuable properties and to its adaptability to these new uses.

The Missouri Silver Mines.—Of the silver ore recently discovered in Greene county, Mo., the Springfield *Patriot* says: "Mr. MASON has just brought to our office some of the quartz, rich in silver, and some specimens of silver, run off by means of an iron skillet, heated in a blacksmith's forge. The specimens of silver were undoubtedly pure, and only slightly tinged with copper. The quartz looked to us like paving rock. Mr. MASON is very sanguine that they have a rich vein of mineral, although work has not yet been prosecuted deeper than ten feet, at which depth the specimen laid before us was taken out. Already tons of quartz have been taken out. It is the intention of the parties to work on, although from their limited resources, and lack of necessary machinery, the work must be slow and tedious."

Receipts of Coal at Boston.—The following table shows the receipts of coal at Boston to September 24, 1870, compared with the corresponding period in 1869:

	1869.	1870.	
Anthracite.....	415,566	376,195	Decrease, 39,371
Cumberland....	112,939	146,302	Increase, 33,393
Nova Scotia....	80,686	78,007	Decrease, 2,679
	609,161	600,504	Decrease, 8,657

Chicopee Emery Works.—The older of the two emery companies at Chicopee is now running its mines and mill vigorously—the latter being obliged to wait, by spells, on account of low water. A steam engine of twenty horse-power is being put in to prevent future delays. Across the "Walker brook" from the mill a storehouse is in process of construction, one hundred feet long and twenty-five feet wide.

The Greatest Geyser in the World.—C. W. COOK informs the *Pick and Plow* that on his trip to the headwaters of the Yellowstone, he discovered a boiling geyser, which threw several inches of water forty or fifty feet up into the air. There were hundreds of other boiling fountains near, the vapor from which made that region seem a world of steam.

Sweet's Steel Works.—The steel works of WILLIAM A. SWEET & Co., at Syracuse, N. Y., which were totally destroyed by fire on the 28th of July, have been thoroughly rebuilt, and, with improved machinery, have resumed the manufacture of seat springs, (SWEET'S patent oil tempered,) and have started their train of rolls for the manufacture of "Excelsior Tire."

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

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A System of Instruction for Engineers.

WE have lately received a pamphlet published by a committee, consisting of Messrs. E. T. GALE, A. L. HOLLEY and C. E. DUTTON, appointed by the Trustees of the Rensselaer Polytechnic Institute, at Troy, N. Y., to examine the system of instruction pursued in that institution, and to report such changes as they considered desirable. The report commences by mentioning the fact that the question of the education of engineers to manage and direct the different branches of industry based on science, is at the present time attracting considerable attention. We may observe that this is true, not only with reference to this country, but is equally applicable to England, as shown by an able address recently delivered by the Dean of Durham, and published in our columns. The comparison of these productions brings out some singular facts. In this country the complaint appears to be that the graduates of our technical schools possess a large amount of theoretical, but not enough practical knowledge to fit them for the places that they are intended to fill; whereas, in England, according to the reverend Dean, the men who there assume the charge of practical operations display a lamentable ignorance of the fundamental principles of the natural sciences.

In considering this question it is well for us to begin with the inquiry of the Polytechnic Committee: "How far is it possible, in a scientific school, to combine practical with theoretical instruction?" They give it as their opinion, that it is possible to a greater degree than is commonly supposed; but the great difficulty seems to arise from the fact that it is next to impossible to define the boundary between theory and practice. It is customary, we are aware, to speak of them as totally distinct branches of a technical education, whereas it seems to us that they are so nearly allied as to render the division of their territories practically impossible. By most people the term theoretical knowledge is used as implying only an acquaintance with the generalities of a certain branch or profession, while practical knowledge means, with them, merely a knowledge of details. When put in this form the question appears much easier of solution, and not even the most bigoted scientist would fail to recognize the importance of detailed knowledge. In every profession there are certain things that can be acquired only by experience, among which we may mention the skill requisite in managing working men to good advantage. These things nobody would dream of attempting to impart in a scientific school any more than in any other; but a knowledge of the details of machinery, for example, can be sufficiently well given by the aid of drawings, models, and, when necessary, by a trip to a good machine shop. With reference to the end to be accomplished by such instructions, the report says:

"We do not expect inexperienced men to compete with established practitioners, and we do expect designers, however learned, to consult with expert artisans as to the details of economical execution. But is it too much to expect one more thing, viz.: that a graduated engineer shall have some idea of what tools will do and what they will not do; of what can and what cannot be executed; of the functions and capabilities, not only of the things made, but of the things that make them? If a graduate has no ideas on these subjects, he is still a student of theory, after he begins practice; he cannot be trusted with any detail of design or execution; he must be constantly watched; he is a mere copyist or tool till he has mastered the rudiments of these subjects; and as his education is not the object of his employer, he is not taken about and lectured and drilled and corrected and examined and made to understand these things. He gets his rudimentary knowledge of them by the longest, the hardest and the most roundabout course, and it is in acquiring these rudiments, that the neophyte meets his most serious delays and embarrassments. They are easily enough acquired when they are specially pointed out, and their development and application follow upon practice, as a matter of course. But they are not specially pointed out. It is a common and serious mistake to suppose that mere employment in engineering work is of itself a systematic and comprehensive course of instruction. For the very want of this rudimentary knowledge, the novice is usually kept in a groove where he can be made useful; no instructor is appointed to tell him what things outside of that groove he ought to learn, or how and where to find the information. * * *

"Now cannot our schools, instead of giving their graduates no hint on many of the subjects they will inevitably encounter before they can earn a living—cannot our schools say to their students: 'We cannot give you experience, nor judgment nor mechanical instinct, but what we can do is to smooth the way and shorten the course. We can at least prevent your groping in the dark after knowledge or going for years without it because you do not know what kind of knowledge you want and where to look for it.'

"Sending men out of a school, full of mathematics and text-book science, but ignorant of even the existence of the co-ordinate branches of knowledge yet to be acquired, appears very much like sending a ship to sea without a chart. The school furnishes its offspring with an engine, a rudder and a compass, and then says to him: 'Now be off—you have many ports to make, and when you find them, you'll know where they are!'

"Your committee are aware that these considerations are unorthodox if not revolutionary, and that if they should appear plausible, they should not be adopted hastily or without more extended investigation."

The committee further complains that a good deal of time during the first year of the course is devoted to teaching subjects which might just as well be learned in preparatory schools, and if it is urged that schools prepared to give such instruction do not exist, they claim that the Troy High-school could be easily brought up to the required standard, and made use of as a preparatory department, and the standard of admission to the Polytechnic raised. They are opposed to a general reduction of the mathematical course, but think that for the mining course it might with advantage be somewhat curtailed. They are further of opinion, that no considerable extension of the course in natural science should be made; that a course of mechanical engineering should be established; that the mining and mechanical engineering courses should discontinue spherical astronomy; that a new professor should be appointed to fill the chair of mechanical engineering; that non-resident professors should be appointed to lighten in a degree the work of regular professors, and conclude with several other recommendations of minor importance. In many of their ideas we fully and heartily concur, but whether some of them would work well in practice we have serious doubts. In support of their views on the subject of practical instruction they refer to the system pursued in the German technical schools. The results of the present war have done more to convince the world of the value of such a system of instruction than anything that could be said or written on the subject. We know from experience that the success of military movements depends in no higher degree upon the ability of the commanding general than upon the intelligence and skill of those who execute his orders. That many officers in the Prussian service received their training in the technical schools is well-known, and thus indirectly the success of the German arms may be attributed to their excellent educational system. The gymnasium, which corresponds, pretty nearly, with our American college, is there the preparatory school for the university, and the *real*-school bears precisely the same relation to the polytechnic, and like the university, has no counterpart in our system. But it is evident that if we wish to make our polytechnics equal to theirs, we cannot omit the important stepping stone offered by the *real*-school. The American High School is our nearest approach to such an institution, and the committee propose to raise the standard of the Troy High School and make it take the place of the real-school. This we consider by far the most important of all their recommendations. It is the first step towards the introduction of the German system of polytechnics.

So far we agree fully with the views of the committee, but it seems that they are not willing to stop here. They wish in a shorter course to impart more practical instruction than has been found possible in the German schools, and we have no doubt that in this respect their proposed system will be properly modified by the trustees. We had better make our system as thorough and complete as the German before we try to outstrip them.

While the Troy Polytechnic is endeavoring to introduce the German polytechnic system, why does not some college direct its efforts to the establishment of a university on the German plan. We are acquainted with no college in the country having greater facilities for taking such a step than Columbia in our own city. The experience of this institution has shown that the system of instruction now pursued does not meet the requirements made upon a city college. The faculty, as a whole, is inferior to none in the country. Their schools of medicine, law and mining rank as high as any, and the college is endowed with the requisite wealth to make any change that they may deem advisable. It is unnecessary for us here to investigate the causes of the decline in the attendance at Columbia College, while that of other colleges throughout the country exhibits an increase. The fact still remains, no matter how it may be accounted for, and the large number of American students who go to Germany to receive a university education, appears to us sufficient guarantee for the success of such an institution in our own country. We are willing to grant that many of the students go abroad as much for the sake of travel as for anything else, but how many more there are, who want a university education but cannot afford to go abroad for it. Columbia College could place such instruction within the reach of everyone.

EDITORIAL CORRESPONDENCE.

Reese River District—The Stetefeldt Furnace.

AUSTIN, Oct. 15, 1870.

REESE River District is "not dead yet," as DANIEL WEBSTER is supposed to have said. Unfortunately, the great statesman was dead in a few minutes after; and here the comparison does not hold; for this district will, I think, hereafter live and flourish once more. Quite a number of mines are working on Lander Hill, though none of them, not even the Manhattan, is able to supply a mill. The Manhattan mill is the only one now running; and its success is what keeps matters going here. Mr. CURTIS, the skilful agent of the company, buys ores from everybody, and is reported to secure for his company immense profits in the business. It is practically a fortified monopoly, since the company owns the exclusive right to treat the ores of this district in the Stetefeldt furnace, and nothing thus far discovered can compete with that furnace for economy and perfection of working. The actual saving in the expense of treating ore is some $12 per ton; and the yield is, at the same time, considerably higher in per centage of the assay value than that of the old reverberatory process. Consequently, the gain in the treatment of rich ores may be $20 per ton and upwards. There is much complaint here that the prices charged by the Manhattan mill are not reduced, in consequence of this great saving by the new process. It is the same feeling as that shown in Colorado towards Prof. HILL. In a certain sense, it is natural and justifiable; in another sense, it is quite unfair. The miner feels wronged when he receives but half the value of his ore, and finds the mill-man or smelter pocketing the largest share of the profits. But this state of things is natural. Mining, especially as it is carried on in most cases here, is a rude and simple business. When bodies of ore are found, they are gouged out, and carried to the reduction works. When no more is found, the mine is generally abandoned, and a new one opened. With the exception of the exorbitant sums expended in wages, there is little capital involved in strictly mining work. Much money is wasted; little is invested. Mills and smelting-works, on the other hand, require capital, skill and business management. They combine commercial with metallurgical risks. They may be ruined by their own failure, by the failure of the mines or by competition, thus being liable to three dangers, where the mines are only exposed to one. In older countries, where the supply of ores for metallurgical establishments is more regular and secure, the risks are not so great. In this country, and especially in Nevada, it is significant and pathetic to see how almost every stamp-mill has been abandoned, sold at auction, transported to other districts, tinkered, re-built and sold and removed again, in disastrous repetition. While the sun shines, such an enterprise must make hay in a hurry; for the rainy day is certainly coming.

It is curious that every man in these regions wants to get high prices for his own labor, and to realize three per cent. a month on his own capital, while he expects other people to be content with fair wages and seven per cent. a year. Incredibly enough, it was the popular impression that foreign capital should and would be contented here with the moderate remuneration which it receives elsewhere. In the early days, there was a unanimous Macedonian cry for capital. Well, capital came, to help "develop the country," and to be, for a time, helpless in the hands of labor and speculation. Science came, in obedience to a similar call; and scientific men found themselves classed with charlatans and pretenders, pitted so long as they would aid the schemes of speculators, and scorned when they attempted honestly to serve the truth and permanently benefit the country.

But the invocation of the aid of capital is not altogether a one-sided affair. The giant has a will of his own, and may turn upon the feeble enchanter. Capital and science have now their hour of revenge. Labor must succumb; speculation must give way; unfortunately, even the interests of the whole community must suffer somewhat for a while—but it is a righteous retribution.

When the Stetefeldt furnace was built and successfully tested at Twin River, the people laughed at it. They did not want any new-fangled notions, merely intended to save a few dollars a ton in treating ore. For some two years, I think, the inventor struggled in vain for an opportunity to prove his success, while one of the "practical" men of Austin pronounced the furnace a "chemical monstrosity." The Reno experiments were received with a sort of stupid surprise; and shortly after, the Manhattan Company purchased, for a large sum, the rights for Reese river district. Now, when it is too late, the people are very righteously indignant to find themselves in the hands of a "monopoly." But without this monopoly they would be a good deal worse off; and, moreover, the profits of the Manhattan Company, large as they now are, are no larger than they ought to be, to reward that association and its agent for the outlay of capital, time and skill which they have made in this district. Mr. ALLAN A. CURTIS has fairly won the reputation he enjoys as the most accomplished mining superintendent in these parts, and no one should grudge him the success he has so abundantly deserved.

But whatever may be the opinion concerning the policy of the Manhattan Company in charging $30 to $35 per ton for reducing ores, and returning only 80 to 85 per cent. of the assay value, one thing ought to be said. The owners of the Stetefeldt furnace have nothing to do with the matter. They have publicly declared their disinclination to dispose of exclusive territorial rights, and they charge no sum whatever for the privilege of erecting the furnace. Their royalty is fixed at $2 per ton of the ore treated, in localities where, as in this place, a saving of from six to ten times that amount can be effected. Whether the Stetefeldt furnace could be successfully run at present under a $2 royalty in Colorado, while the supply of silver ores is precarious, the cost of fuel comparatively low, and the Brickner cylinder a more dangerous competitor than the reverberatory—

is a question of some difficulty. Mr. J. O. STEWART, the manager of the new reduction works at Georgetown, evidently believed something of the kind possible, and attempted to obtain the exclusive right to Clear Creek County, embracing thirty-three mining districts, all but one or two of the important silver districts in the Territory. No wonder if the terms of the Furnace Company for this enormous privilege were such as Mr. STEWART considered high. People cannot afford to give away territory for nothing. Mr. STEWART is now interested in the so-called AIREY furnace, which is expected to rival that of STETEFELDT; and one or two of this kind are in process of construction. Opinions concerning it vary; some say it is a palpable infringement on other patents; some predict that it will not work. All I can say of it at present is, that Mr. STEWART probably knows what he is about, and if he is risking his money on a thing which is either legally or metallurgically unsound, he is doing what his reputation as a careful and intelligent man would scarcely lead me to expect. Any comparison between the AIREY and the STETEFELDT furnace would now be premature. The latter is an approved and brilliant success. The former has yet to show what it is. The question of interference with patent rights is one for the courts, and the sooner it is settled the better for all parties. The pity of it is that Colorado can not well bear the discouragement of repeated experiments, and this one may possibly fail, as so many former promising ones have done. Hence, I cannot help saying that I wish Mr. STEWART or Mr. HUEPEDEN could have made some fair arrangement for the introduction of the STETEFELDT furnace, the success of which is beyond doubt. Even the success of the AIREY will only bring on a fight, and the country will suffer by it as well as the parties themselves. But I suppose it is now too late for any such desirable settlement; and so I say heartily, may the experiment be fairly and promptly tried, and may the result be decisive.

R. W. R.

South Wales Institute of Engineers.

From the able Inaugural Address of Mr. W. T. LARVIS, President of this Society, we make the following extracts.

REFERRING to the papers which have been read and discussed from time to time, I find that my predecessor (Mr. BEDLINGTON,) reviewed them so fully only a short time ago, that I have little or nothing to say; but, with your permission, I should like to mention a few matters which, in my opinion, we would do well to re-open, and others that in would be interesting as well as advantageous to the district, if the institute took them under consideration. Among the first, is that of the economic value of fuel. A very able paper upon this subject was contributed to this institute in August, 1860, but in consequence of the writer's inability to attend the meetings, the matter was not discussed so fully as it deserved. Without going into the theoretic value of coal, and the enormous waste set forth in that paper, it appears to me that a very great saving is to be effected by a little more attention to the construction of our boilers, the amount of boiler-power, provision for heating the water, preventing the radiation and loss of heat, and the general arrangements in every-day practice of our mechanical engineers. The quantity of fuel that has been wasted in the South Wales district is perfectly astounding; and I am sure, if I were to give figures, they would not be credited. It no doubt arose, to a very great extent, from the abundance and cheapness of the coal, for while large coal was being consumed here regardless of quantity, and without any effort made to preserve and utilize the heat obtained, other manufacturing districts, not blessed with coal under their feet, were (in consequence of its comparatively high price,) obliged to devise means for obtaining two or three times the work out of every ton of coal that we did here, and also to consume their small coal and utilize gases for heating. Keen competition, and the low price of iron, however, forced our ironmasters to the use of their waste gases, hot blast, and small coal, in the manufacture of iron and thus effect a very great saving in fuel; but there is still very much to be done in reducing the quantity of fuel wasted in the getting up of steam, and in preserving the power when once obtained. Great economy might be realized even with our present system by increased boiler power—improved draught—so as to consume small coal and refuse, the heating of the feed water by the exhaust steam, and the waste heat on its way to the stack, the effectual covering of all the boilers, steam pipes, cylinders, etc.; but we should not rest satisfied until we have a much more perfect form of boiler, whereby only about one and a half to two pounds of coal per horse-power per hour would be consumed. Even the arrangements common in this district may, by a comparatively small cost, be improved so as to reduce the consumption of coal one-half. There are several places within my own knowledge where, by improvements such as I have sketched out, the consumption of fuel is now 50 per cent. less than formerly—and small coal is used instead of large. The matter is one of national importance, inasmuch as we are wasting 50 per cent. of the very material which has really been the means of making this country the seat of manufacture for the greater portion of the world; and of now holding its own with the manufacturing centres on the continent; but to us, engaged in the getting, using, and disposing of the coal, it must present itself most forcibly, with the constantly increasing tendency to run up the cost of getting coal in this district. Even if a saving of 25 per cent. could be effected in the coal consumed for steam purposes in the South Wales mineral basin alone, the value of it per annum would represent above £105,000. The consumption per horse-power per hour, even then, would be far in excess of some of the improved engines and boilers now used in districts where fuel costs twice or thrice what it does here. In fact, there are some engine and boilermakers that now guarantee their engines and boilers not to consume more than one and a half pounds per horse-power per hour, while a great many of our engines in this district consume eight pounds to ten pounds per horse-power per hour.

With these facts before us, although the contrast may, to some extent, be modified according to circumstances, I hardly need dwell upon the desirability of the institute again taking into consideration, and thoroughly investigating, this important question of the most economical mode of using our fuel. Another subject, closely allied to the use of fuel, is that of the large proportion of coal lost in working, and left underground, upon which a paper was read before this institute in the year 1861. Although very great improvement has taken place in a portion of the South Wales mineral basin in this respect since the introduction of the long-wall system (which I may here mention owes its general adoption in this district to the papers and discussions of this institute, and for which all interested in the minerals, both as landlords and tenants, are much indebted,) still a very large proportion of coal is left underground, amounting to an average of at least 18 per cent. This is, again, a very serious loss, and deserves most careful attention. A great many appliances have been tried from time to time, worked by air, by water, and by steam, for the purpose of holeing, cutting, and bringing the coal down, in lieu of manual labor, having for their object the reduction in the cost of getting the coal, and securing the greatest possible proportion of large coal; but up to this time the success of most of them has been questionable, for various reasons, which I need not here dwell upon. However, it appears from repeated trials that have been made in different seams in several districts, that some of the most recent coal-getting machines are likely to prove successful in reducing the loss in small coal in hard seams, as well as doing away with the necessity of blasting coal, which, as you are aware, is unfortunately a fruitful source of accidents. I will not weary you with the details of either machine, but I may say that the power applied is very simple, being a small quantity of water forced in by a hydraulic ram, and exerting a pressure of above twelve tons per square inch, which brings the coal down in large blocks. These machines may be carried about from stall to stall, and are easily worked by unskilled men, and although there are but few of them so far in general use, yet there appears no doubt that the principle is the best yet tried; and their introduction (or improvements upon them,) seems to be only a work of time, as there are several advantages attending their use, besides placing colliery owners less dependent upon their colliers. My principal object in referring to them here is to state that in certain seams, more especially those requiring holeing in the coal, a very great saving is effected in the quantity of small made; and where they are used instead of powder the small is reduced, and the large is obtained in a very much better condition, not being shattered through, as coal blown down by powder is generally found to be. Several of the machines are at work in this district, and, considering the importance of reducing the enormous loss daily going on at our collieries, independent of the advantage alleged by the patentees in the cost of getting the coal, there can be no doubt as to the desirability of having the matter fully considered and discussed by this institute. I should not omit mentioning, while on this question of small coal, that the introduction of washing machines will enable a great deal of our small coal, now comparatively worthless, being brought into use, and that the paper upon those machines, now before the institute, deserves the fullest consideration and discussion. Bearing upon this small coal matter, is another, very materially affecting the interest of all concerned in the steam coal trade of this district—i. e., the enormous loss in small coal in the transit from the working face to the shipping port. This loss is a most serious one, and very considerably depreciates the value of mineral property—as well as the collieries upon this description of coal in this immediate locality—arising, to a very great extent, from the peculiar fracture of the coal, and the unnecessary extent that the screening and double screening of the coal has grown to during the last fourteen years, whereby about 9 per cent. of small is taken out by passing the coal over the screens at the colliery, and 8 to 10 per cent more extracted by means of double screening at the port. Some efforts have been made with the view of reducing the breakage caused by shipping the coal from the colliers' trams into the wagons by improved screens, and also at the port, by means of anti-breakage apparatus, and recently by hydraulic cranes, for dropping the coal into the hold of the vessel in barrows: but there is still, with all the care exercised, an enormous loss, so much so that, on an average, every ton of coal *in situ* is, by the means now generally adopted, reduced to about 14 cwt. of large coal on board ship, (assuming only twenty-four miles of lead to port,) the remainder being made up of 1.3 cwt. of small coal at port, 1.4 cwt. of small on the colliery bank, and 3.6 cwt. left underground, the net realized being 13.7 cwt. of large coal and about 2.7 cwt. of small coal. Putting a money value upon this process—assuming a seam of coal in a mineral property to be worked out at the rate of 300 tons per day—the present result of a year's working is as follows:

90,000 tons of large coal, extracted from the property, worth, say, 7s. 6d. per ton at pit's mouth		£32,750
61,114 tons of large coal, d.o.b., say at Cardiff, at a price equal to 7s. 6d. per ton at colliery	£22,917	
6,642 tons of small coal at colliery, at 2s. per ton	664	
6,044 tons of small coal at Cardiff, at a price equal to 2s. per ton at the colliery	604	
		24,185
Loss per annum		£8,565

I am aware that this is an extreme mode of stating the question, inasmuch as it is practically impossible to get the coal and remove it without a certain loss, but it is useful as an illustration of the gross waste of property daily taking place among us by the present barbarous mode of treating the coal, and to show that an effort should be made to reduce this enormous loss to the minimum, which ought not to exceed one-half of what it is at present, or 12 to 15 per cent. It is a most difficult matter to grapple, and requires great consideration, but without it is brought home to those interested, in the shape of pounds, shillings, and pence, there is but little hope of any attempt being made to alleviate the evil. What we want, first of all, is to reduce the loss in getting the coal, then to secure the coal filled clean, and have it handled as little as possible between the working face and the port. Of course, if it were practicable for the coal to be filled into such tubs in the workings as could be sent right to the ship, the minimum breakage would be attained. Next to that would be the sending of the coal from the colliery, and screening it only at the port, by which, in my opinion, a great saving would be effected in the gross small made.

There are many difficulties to be dealt with, whatever change is attempted; but the present losses are so enormous that if only a small per centage can be saved, it would represent a large sum per annum on the working of an average steam coal colliery, and leave a margin to cover the additional expenses and trouble that extra care and a change in the manipulation would entail. This matter is second to none in importance in our steam coal district, and this institute would, in my opinion, sadly fail in its duties if such enormous losses are allowed to go on without, at all events, having the matter fully considered and discussed with the view, as far as possible, of remedying the present defects. Before leaving this subject, I should call attention to a paper recently supplied to the institute upon large and small trams, which elicited a great deal of discussion, but hardly as much as its importance merited; and it would, therefore, be very desirable to have the whole subject re-opened with the view of getting more information as to the experience with all the trams used in this district, having regard not only to the cost of working, but also to the effect upon the quantity of large coal obtained. Underground haulage has been treated upon in several papers, but we have had little or no information about what appears to be, with but few exceptions, the most economical as far as the cost of maintenance and working charges are concerned, viz.: the endless chain system, which is at work in a few places in this district, but most extensively in Lancashire. There are, doubtless, very great advantages attending its use, but considering that its adoption necessitates double roads, the difficulties we have to contend with in our underground workings, in bad roofs, and in keeping up the sides in our principal seams, together with the alterations which it would necessitate in our trams, I am afraid the extra expense would more than cover the advantages to be derived from its adoption in this district; however, there is no reason why it may not be introduced extensively in our surface operations. But there is very much to be done here with the tail rope and other systems of underground haulage, in which we are far behind the best collieries in other districts, and which must have more of our attention as the length of haulage increases and our collieries become deeper and more extensive generally. Several contributions have been made to our proceedings respecting the ventilation of mines, but, so far as I have been able to ascertain, the proper distribution of air in mines, having regard to the number of splits, the length of the splits, and relative quantities for the several splits, does not seem to have been treated upon in either of the papers. Next to providing an ample quantity of air, to circulate between the downcast (through the workings) and the upcast shaft, is the most economical distribution of it through the several districts of the mine; and I am inclined to think that this important subject has not received the consideration which it merits at some of our collieries in this district; so that it would be very desirable to have it treated upon by some of the managers of our largest collieries, where the splitting of air is necessarily carried out to a great extent. The working of thin seams of coal has had but little attention in this district as compared with what is done in the Bristol and Somersetshire coal fields. Up to this time, it has been the practice in this immediate locality to leave unworked seams of about two feet six inches and under; but now that the principal or most remunerative seams of coal are becoming exhausted at some of the collieries on the crop, we shall have to turn our attention to the getting of the coal in the thinner seams down to 2 ft., and even 18 in., thick. This, as well as the order in which the seams of coal under a property should be worked, and the effect that the working of one seam has upon the quality and upon the cost of getting seams immediately above and below, is deserving of more deliberation; indeed, the latter is most important, as a great many of the difficulties to be contended with in the working of seams comparatively near together (from bad roofs, and various other obstacles tending greatly to increase the working of the coal,) arise, to a very great extent, from the working of the seams regardless of order or precedence. There are such a variety of circumstances to be considered, which vary very much even in adjoining collieries, that it is difficult to lay down fixed rules; but if careful observations were made by colliery managers working the various seams in different order, and a record of them, together with the thickness and nature of the intermediate strata, quantity of gas, etc., was communicated to the institute, there can be no doubt that some conclusions would be arrived at which would prove of very great benefit to the district. Another matter which does not seem to have had much attention, is that of the best mode of opening out collieries in maiden districts, referring more especially to our steam coals, in localities where the gases have not been tapped by the crop workings. A great difference of opinion exists as to the best mode of proceeding, having regard to the freeing of the gases, in a manner so as to ensure the least possible risk of explosions. Many very serious accidents have occurred in such operations—in fact, most of the great explosions during the

last thirty years; and, considering that we shall have to sink pits and open out collieries in a great many of our valleys, where there has been no opportunity of crop workings, I think the institute should look upon this subject as one of the most pressing upon its attention. It has been the practice of the North of England Institute of Engineers, whenever an explosion of any magnitude has unfortunately taken place in their district, to arrange for a paper to be read, giving a detailed account, as far as the facts could be ascertained of the whole of the circumstances, whereupon discussions have taken place with the view of determining as far as possible the causes of the accidents, and considering the means necessary to be adopted for preventing their recurrence. Such papers, describing the means adopted for restoring the ventilation, getting the workings into order, putting out standing fires, and of overcoming various difficulties upon such events, would be of great practical benefit to colliery viewers, and it has occurred to me that we should do well to follow the steps of the sister institute in the north in this matter.

The next subject having an important bearing upon the conduct of collieries in this district, is the question of single or double shift, which was brought before the Institute a few years ago, and fully discussed. The conclusions arrived at then were, if I mistake not, altogether in favor of double shift, but the difficulty of introducing it seemed at that time insurmountable. The matter was so thoroughly ventilated at the time, and the advantages with regard to reducing the risk of accidents were so clearly set forth, that I need not here dwell upon it, and my only object in now referring to it is for the purpose of suggesting whether it would not be advisable to have the discussion re-opened, with the view of considering in what way so desirable a change could best be brought about. The Institute has had very little, if any, information contributed upon the sinking and tubbing of shafts, and now that sinkings of much greater depth will have to be made to win our deep minerals, it would be interesting to have these subjects well discussed. For although we are not beset with such difficulties as have to be contended with in some of the deep pits in other coal fields, still, in some situations, a great thickness of sand and gravel, with comparatively large quantities of water, is met with, and it would be advantageous to have a paper upon sinking and tubbing by some one having had practical experience in such works. Very able papers have been supplied upon various parts of the South Wales coal field, as also upon the quantity of unworked coal in the whole of the basin; we need not trouble ourselves about the latter until the report of the coal commission is out, when I have no doubt there will be a great deal of discussion as to the conclusions arrived at with regard to the quantity of coal as well as the identity of the seams. But we have had little or no particulars about the eastern or western portion of the mineral basin, nor has there been any upon the interesting subject of the causes of the changes in the quality of the various seams of coal from east to west, nor upon the identity of the various seams of coal and iron-stone, together with the most prominent features of the coal field, (*i. e.*, the Upper and Lower Pennant Rocks) all of which would be most interesting subjects. There is another matter in connection with our mineral field which it would be exceedingly desirable to place on record—that is, an account of the faults, wash-outs, and other disturbances proved by the various operations. Doubtless there would be some objection to going much into detail on this subject, as it might probably tend to depreciate the value of properties containing them; but there would be no difficulty in describing the general features, with the probable direction and extent, etc., so that the information may prove useful in future explorations. Passing from the coal to the iron trade, the President said: The Institute owes its origin to the iron trade, and ever since the first meeting, those connected with the South Wales iron trade have strenuously supported it, and contributed papers from time to time upon the various improvements effected in blast furnaces, manufacture of coke, manufacture of steel, selection and treatment of coal for blast furnaces, regenerative furnaces, blooming rolls, etc., etc., but we have had no paper upon the all-important matter of the economising of fuel in the manufacture of iron, and on the best means to be devised for the purpose of extending the use of our native iron-stone, the consumption of which has for some years past been gradually falling off, while the quantity of iron made in the district has been increasing. Very great improvements have been and are being made at some of our iron-works in increased makes of iron, in reducing the quantity of large coal, and in consuming small coal in the manufacture of iron, but many are still going on upon the old system. As an instance of what has been done at an iron-worker's in this district, I may mention that they now make six times the quantity of iron per furnace that they did twenty years ago; and by a proper admixture of coal and coke, utilization of gases, hot blast, etc., the quantity of fuel per ton of pig iron is less than one-half what it was then. In puddling furnaces again, by the introduction of the blast with small coal, the fuel has been reduced twelve per cent. in quantity, while only a third or fourth of large coal is used. While the manufacture of iron has made great strides in this district in the last twenty years, there is still more to be done, in the substitution of machinery for manual labor, and the utilization of all the resources at our command, to enable this district to keep pace with other places having the advantage over us in respect to the important item of iron ore. As will be seen by the able paper contributed by Mr. E. WILLIAMS, our friends in the North are far outstripping us in improvements in their furnaces and the economizing of fuel, and it is our duty to benefit by the experiments they have made, and avail ourselves of the improvements, so far as they apply to the ores at our command. As for fuel, we need not fear our best coal yielding coke equal to Durham. There is therefore no reason why we may not ze equally good results. The cost at which our argillaceous iron-stone is obtained, the low percentage of iron contained, and the difficulty of smelting it, are serious obstacles in attempting to use it in any large proportion; but looking at the immense quautities in which this district abounds, a great portion of which can be wrought by open patches and levels, and some of it with coals, we surely ought to take the matter into consideration, with the view of ascertaining what means, if any, in improvements in furnaces, etc., can be devised for continuing, if not extending its consumption in a profitable manner, instead of, as at present, gradually reducing it; and I would invite the serious attention of the Institute to this matter. Besides the argillaceous iron-stone, we have in the basin several deposits of hematite iron ore, lying above, and in the limestone and in the shales of the old red sandstone, which have hardly been fully developed, and does not seem to have been brought before the notice of this Institute. It is not impossible that a paper giving a full description of the iron ore mines already at work, might lead to further trials being made in ore-bearing ground, and discoveries made whereby our works may be very much less dependent on the importation of foreign ores. There is only one other matter which I will trouble you upon; that is, to suggest that important questions requiring much time and consideration in experiments, the getting up of information and plans, etc., should be placed in the hands of committees of members of the Institute, in the same way as is practiced in the North, and where, I am informed, it has proved highly satisfactory; and also that a list of subjects should be drawn up by the Council of the Institute every year, upon which they should invite papers; and that premiums of books or medals should be awarded to the writers of the best papers. This works remarkably well in the Institute of Civil Engineers, and I believe it would tend to materially improve the position, as well as increase the usefulness of our Institute. There are many other matters having an important bearing upon the mineral wealth and manufactures of our district, which I cannot at present refer to, having already far exceeded the bounds of a reasonable address. I will therefore close by asking your serious consideration of the several points worthy of attention; and if, during my term of office, we shall be able to do something towards reducing the enormous losses caused by the present mode of working and treating our minerals, and secure their being worked and used in a more economical manner with the least possible risk of life, I shall not have occupied your time in vain, and this Institute will have conferred an additional boon upon our district, and fully realized some of its objects.

The President's address was received with frequent remarks of approbation.

In the absence of the writer, the discussion on Mr. E. W. RICHARD'S paper, on Bérnard's Coal Washing Machine, already published, was adjourned.

The discussion of the papers by Mr. ALLISON and Mr. E. WILLIAMS, on the Cleveland Iron-stone, and the Blast Furnaces at the Cleveland Iron Works, which also have appeared, was likewise adjourned, a hope being expressed that the writers would be present at the next meeting, and that Mr. WHITWELL would then be able to attend, the discussion of his paper, too, being postponed.

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108,551.—HORSE-HAY FORK.—Charles N. Baldwin, Wilmington, Conn.

108,552.—BORING-MACHINE.—Charles N. Baldwin, Wilmington, Conn.

108,553, antedated October 12, 1870.—METALLIC FISH-NETS, &c.—William Beck, New York, N. Y.

108,554, antedated October 20, 1870.—STEAM-PUMP.—George F. Blake. Boston, Mass.

108,255.—COMPASS FOR MINING.—Johan Blomgren, New York, N. Y.

108,556.—FLASK FOR CASTING STAMP-SHOES FOR CRUSHING-MILLS.—Henry Bolthoff, Central City, Colorado Territory.

108,557.—WINDOW-BLIND.—James P. Boyd, La Porte, Ind., assignor to himself and Aaron H. Miller, same place.

108,558.—APPARATUS FOR DEODORIZING AND IMPROVING ALCOHOLIC AND VINOUS LIQUORS.—Leverett Bradley, Jersey City, N. J.

108,559.—HORSE-COLLAR FASTENINGS.—August Bratnober, Webster county, Iowa.

108,560.—MELODEON.—Thomas Brett, Geneva, Ohio.

108,561.—PERMUTATION-LOCK.—Edward W. Brettell, Elizabeth, N. J.

108,565.—HAT-POUNCING MACHINE.—James B. Brown, Danbury, Conn.

108,563.—OIL-CLOTH PRINTING MACHINERY.—Alexander Fordyce Buchanan, East Newark, N. J.

108,564.—LINK FOR ENDLESS-CHAIN HORSE-POWER.—George E. Burt, Harvard, Mass.

108,565.—SNOW-PLOW.—Albert M. Butts, Waterbury, Conn.

108,566.—ASPHALT PAVEMENT.—Alonzo C. Campbell, New York, N. Y.

108,567.—SHIRT.—William H. Carroll, Columbus, Miss.

108,568.—FAUCET.—William F. Class and Leo W. Sapp, Cleveland, Ohio.

108,569.—WORK-HOLDER.—Nicholas Clute, Schenectady, N. Y., and Oliver W. Marshall, Hartford, Conn.

108,570.—STAMP-BATTERY.—George D. Crocker, Virginia City, Nevada.

108,571.—MANUFACTURE OF WHITE LEAD.—Charles W. Dwelle, St. Louis, Mo.

108,572.—DEVICE FOR OPERATING SKY-LIGHT.—William Dyatt, New York, N. Y,

108,573.—PENCIL-HOLDER.—Charles A. Eaton, Minneapolis, Minn., assignor to himself and George F. Bolles, same place.

108,574.—COMBINED STEAM AND GAS-ENGINE.—Joel A. H. Ellis, Springfield, Vt.

108,575.—CLOTHES-DRIER.—John Emmert, Dunleith, Ill.

108,576.—STEAM-ENGINE.—Philip Estes, Leavenworth, Kansas.

108,577.—GRAIN-SEPARATOR.—John G. Evans, Orrville, Ohio.

108,578.—JEWELRY-PIN.—Israel Farjeon, New York, N. Y., and William H. Horton, Jersey City, N. J.

108,479.—GAS-BURNER.—Charles S. Ford, Philadelphia, Pa., assignor to Charles Young, same place.

108,580.—COTTON-PLANTER.—Abraham G. W. Foster, Franklin, Ga.

108,581.—SKATE-FASTENING.—Bernard Gallagher, St. John, New Brunswick.

108,582.—WOOD PAVEMENT.—Carol Gaytes, Chicago, Ill.

108,583.—GAS-HEATER.—Richard George, Kilburn, England.

108,584, antedated October 8, 1870.—PUTTING UP SOAP.—Wm. Freeman George, New York, N. Y.

108,585.—PREVENTING THE DEVIATION OF SHIP'S COMPASS.—John Ward Girdlestone, 37 Norfolk street, Strand, England.

108,586.—PLANE.—Winslow B. Glover, Boston, Mass.

108,587.—GAME.—D. Frank Hale, Chicopee, Mass.

108,588, antedated October 21, 1870.—FASTENING ARTIFICIAL TEETH TO METALLIC PLATE.—Herman B. Hale, Rockford, Ill.

108,589.—CARPET-BEATER.—William H. Hankinson, New York, N. Y.

108,590, antedated October 11, 1870.—EXTENSION HAT-RACK.—Nathan Hayden, Chicago, Ill.

108,591.—POTATO-PLANTER.—Theodore Herbert, Philadelphia, Pa.

108,592.—FLOWER-CASKET.—John M. Hess, Philadelphia, Pa.

108,593, antedated October 8, 1870.—WIND-WHEEL.—James O. Heyworth and Herman E. Fessel, Chicago, Ill.

108,594.—MACHINE FOR SECURING HEADS TO METALLIC KEGS.—William Hill, Pottsville, Pa.

108,595.—THREAD-SPOOL.—Isaac L. Hoard, Bristol, R. I.

108,596.—POCKET CUTLERY.—Daniel R. Hundley, Mountain Home, Ala.

108,597.—REIN-HOLDER.—Davis Hurd, Lockport, N. Y.

108,598.—CAR-COUPLING.—George W. Irish, Memphis, N. Y.

108,599.—HAY AND COTTON-PRESS.—Joseph H. Johnson, Griffin, Ga.

108,600.—COTTON-BALE TIE.—Edward P. Jones, Sun Flower county, Miss.

108,601, antedated October 15, 1870.—KNIFE HOLDER AND GUIDER FOR HEEL-CUTTING MACHINE.—Samuel Keen, East Bridgewater, Mass.

108,602.—GALVANIC-BATTERY.—Jerome Kidder, New York, N. Y.

108,603.—MEDICAL COMPOUND FOR FOWLS.—Jacob H. Kipp, Millerstown, Pa.

108,604.—STEAM-GENERATOR.—Truckson S. La France, Elmira, N. Y.

108,605.—MACHINE FOR CUTTING HEELS OF BOOTS AND SHOES.—Richard C. Lambart, South Abington, assignor to David Whittemore, North Bridgewater, Mass.

108,606.—METHOD OF COOLING BEER-WORTS, &c.—O. P. Lewis, Cincinnati, Ohio.

108,607.—WAGON-AXLE.—William A. Lewis, Joliet, Ill.

108,608.—WAGON-AXLE.—William A. Lewis, Joliet, Ill.

108,609.—WAGON-AXLE.—William A. Lewis, Joliet, Ill.

108,610.—TONGUE-BRACE AND BALANCE FOR WAGONS.—Andrew J. Mapes, Independence, Mo.

108,611.—MOSQUITO-BAR.—Theophile Masac, Good Hope Plantation, La.

108,612.—HUB FOR CARRIAGE.—James A. Maynard, Newtonville, Mass.

108,613.—NUT-LOCK.—Henry W. McAuley, Sterling, Wis.

108,614.—CART-SADDLE.—William B. McClure, Alexandria, Va.

108,615.—COPYING INK FOR PRINTING.—Charles McIlvaine, Philadelphia, Pa.

108,616.—DRIER.—Charles A. Moffat, Indianapolis, Ind.

108,617.—ORE PULVERIZER.—Frederick C. Morse, Buckskin, Colorado Territory.

108,618, antedated October 20, 1870.—LOW-WATER INDICATOR.—Adolphus F. W. Neynaber, Philadelphia, Pa.

108,619.—CANCELING-STAMP.—George G. Noyes, Worcester, Mass.

108,620.—CLOTHES-WRINGER.—Abiel O'Dell, Napanee, Canada.

108,621.—CHAIN-LINK AND BAR.—David A. Peloubet, Hudson City, N. J., assignor to Warren, Spadone & Co., New York City.

108,622.—BED AND BED-BOTTOM.—J. William C. Peters and W. A. Le Pow, Chicago, Ill.

108,623.—PAPER-FILE.—Simon E. Pettee and Clarence A. Wolle, Bethlehem, Pa.

108,624.—MACHINE FOR DRIVING NAILS.—Samuel W. Phelps, Sandusky, Ohio.

108,625, antedated October 13, 1870.—MAP-STAND.—William F. Phelps, Winona Minn.

108,626, antedated October 11, 1870.—PADDLE-WHEEL.—John W. Post, Castile, Pa.

108,627.—REMOVING SOLUBLE SALTS FROM ARTIFICIAL STONE.—Ernest Leslie Ransome, Greenwich, England.

108,628.—GATE.—Charles D. Reed, Polo, Ill.

108,629, antedated October 15, 1870.—CIGAR-MACHINE.—John O. Reilley, Baltimore, Md., assignor to himself, William Wallace Perkins, and Calvin C. Chance.

108,630.—INKING APPARATUS FOR COLOR-PRINTING.—Israel L. G. Rice, Cambridge, Mass.

108,631, antedated September 30, 1870.—CHURN.—James C. Richardson, Prairie Du Chien, and Lemuel Taylor, Jordan, Wis.

108,632.—DUMPING-CAR.—William Riley, Jr., Terre Haute, Ind.

108,633.—ELECTRO-MAGNETIC RAILROAD-SIGNAL.—W. Robinson, Brooklyn, N. Y.

108,634.—TIRE-MACHINE.—Samuel Roe, Jr., Boonville, Mo.

108,635.—WRITING-DESK.—Ernest Scheel, New York, N. Y.

108,636.—SPRING.—John M. Schmidt, New Albany, Ind.

108,637.—AUTOMATIC FAN.—John Schnell and Peter Schmitt, Waterloo, Ill.

108,638.—REIN-HOLDER.—Francis B. Scott, Lancaster, N. Y., assignor to himself and C. S. S. Dennox, Townsend, Mass.

108,639.—AWNING.—Louis G. Sert and Christian L. Schurr, Baltimore, Md.

108,640.—CALIPERS.—William A. Sharpe, Syracuse, N. Y.

108,641.—PLATES AND BARS FOR CONSTRUCTION OF PLOWS, CULTIVATOR-TEETH, &c.—William H. Singer, Pittsburg, Pa.

108,642.—SASH-HOLDER.—Emerson D. Slater, Greenville, N. Y.

108,643.—COTTON-SEED PLANTER.—Andrew C. Smith, Roaring Falls, Tenn.

108,644.—LAND-MARKER FOR CORN-PLANTING.—Arthur C. Smith, Joyner's Depot, N. C.

108,645.—CIDER-MILL.—James K. P. Smith, Jeffersonville, Ind. assignor to himself and L. S. Shuler, same place.

108,646.—WASHING-MACHINE.—Stephen M. Smith, Canal Dover, Ohio.

108,647.—MOLDING-PIPE.—William Smith, Pittsburg, Pa.

108,648, antedated October 15, 1870.—MACHINE FOR SHAVING THE HEADS OF SCREW-BLANKS.—James F. Starrett, New York, N. Y.

108,649.—CARRIAGE-SPRING.—Sidney Steward, Trenton, N. J.

108,650.—SPRING BED-BOTTOM.—Philip Stovall, Newman, Ga.

108,651.—CARPET-CLEANER.—Robert Teary and Frederick W. Hafkemeyer, Chicago, Ill.

108,652.—PUMP-SIPHON.—Thomas J. Trapp, Williamsport, Pa.

108,653.—PISTON-PACKING.—Lawrence Turner, New Orleans, La.

108,654.—SCALE-BEAM.—John H. Usher, Buffalo, N. Y., assignor to "The Buffalo and Niagara Scale-works Company, same place.

108,655.—MACHINE FOR ASSORTING POTATOES.—Benjamin D. Vanderveer, David A. Vanderveer, and Tunis Denise, Freehold, N. J.
108,656.—CORN-PLANTER.—George B. Vaugham, Marshall, Mo.
108,657.—PRESS FOR REMOVING LIQUID MATTER FROM VARIOUS SUBSTANCES.—Jason Waters, West Sutton, Mass.
108,658.—HYDRAULIC MINING APPARATUS.—Thomas Watson, Nevada City, Cal.
108,659.—PRESERVING WOOD.—Ezra Webb, New York, N. Y.
108,660.—DIE FOR MOLDING BUTTONS.—William M. Welling, New York, N. Y.
108,661.—CEMENT FOR COATING AND PROTECTING WOOD.—Henry M. Westman, East Boston, Mass.
108,662.—SKATE.—Corydon Wheat, Geneva, N. Y.
108,663.—TUBULAR BRIDGE.—George H. White, New York, N. Y.
108,664.—UTILIZING SEWAGE.—George William Wigner, London, England.
108,665.—SAW-MILL.—William M. Wilkin, Kalamazoo, Mich.
108,666, antedated October 8, 1870.—ROOFING CEMENT.—James T. Wilkinson, Lockport, N. Y.
108,667.—LAMP-BURNER.—Samuel R. Wilmot, Bridgeport, Ct.
108,668.—BARK-SHAVING MACHINE.—Martin Winger, Ephrata, Pa.
108,669.—MANUFACTURE OF QUERCITRON-BARK.—Martin Winger, Ephrata, Pa.
108,670.—RAILWAY-GATE.—Edwin Woodbury, Sharon, Pa.
108,671, antedated October 7, 1870.—PLOW-HANDLE.—William E. Wyche, Brookville, N. C.
108,672.—PLANTING AND FERTILIZING-MACHINE.—Samuel Leeds Allen, Cinnaminson, N. J.
108,673.—LUBRICATING DEVICE FOR BOLT-THREADING MACHINES.—William Armstrong, Kent, Ohio, assignor to himself and Ezra Miller, New York City.
108,674.—WRINGING-MACHINE.—Elbridge G. W. Bartlett, Providence, R. I.
108,675.—MACHINE FOR FELLING TREES.—Henry J. Beard, New Sharon, Me., assignor to himself and James Hawes, Jr.
108,676.—PAPER-CUFF.—Sumner A. Bemis, Albert E. Forth, and James W. Goodrich, Springfield, Mass.
108,677.—MACHINE FOR HEELING BOOTS AND SHOES.—Horace H. Bigelow, Worcester, Mass.
108,678.—MACHINE FOR FINISHING HEELS ON BOOTS AND SHOES.—Horace H. Bigelow, Worcester, Mass.
108,679.—DETACHABLY-TIPPED WHIP.—Pardon Boyden, Amsterdam, N. Y.
108,680.—REELING-MACHINE—John Briggs, Higganum, Conn.
108,681.—FAN.—Otto Brueck, New York, N. Y.
108,682.—PISTON.—Isaiah Davis Buck, Conshohocken, Pa.
108,683.—BRACELET.—Henry Carlisle, Jr., Philadelphia, Pa.
108,684.—HORSESHOE.—Jesse K. Christopher, Dayton, Ohio.
108,685.—COUPLING ATTACHMENT FOR PIANO.—John Clark, Philadelphia, Pa., assignor to himself and Alfred Adamson, same place.
108,686.—CUTTING APPARATUS FOR HARVESTERS.—T. J. Clark and George M. Clark, Higganum, Conn.
108,687.—MACHINE FOR SKIVING LEATHER.—John P. Crooks, Hopkinton, assignor to George E. Franklin, Natick, Mass., assignor to Leonard Morris, same place.
108,688.—SELF-ACTING MULES FOR SPINNING.—John Cumnock, Salmon Falls, N. H.
108,689.—WASHING-MACHINE.—Ezra Davis, Keokuk, Iowa.
108,690.—HARROW.—James Dawson, Greenwood, Ill.
108,691.—COOKING-RANGE.—Royal E. Deane, New York, N. Y.
108,692.—ROTARY DISINTEGRATOR.—Henry Bucsh, Baltimore, Md.
108,693.—CONCRETE FOR PAVEMENT, &c.—George Hugh Sinclair Duffus, Baltimore, Md., assignor to himself and Henry J. Davison, New York City.
108,694.—HOLLOW-WICK LAMP-BURNER.—John W. Emerson, Milbury, Mass.
108,695.—RETORT-FURNACE.—Adolph Faber Du Faur, Newark, N. J., assignor to himself and Edward Balbach, Jr.
108,696.—PAVEMENT.—Lewis S. Filbert, Philadelphia, Pa.
108,697.—WOOD-PAVEMENT.—Lambert T. Follansbee, Washington, D. C., assignor to himself and George W. Linville, same place.
108,698.—RAILWAY-CAR-COUPLER AND BUFFER.—Perry G. Gardiner, New York, N. Y.
108,699.—PLOW.—Martin L. Gibbs, Canton, Ohio.
108,700.—WOODEN BOX.—William Gilbert, Catskilil N. Y., assignor to N. K. Fairbank, Chicago, Ill.
108,701.—EVAPORATING APPARATUS.—Samuel D. Gilson, Syracuse, N. Y.
108,702.—RAILROAD-CAR HEATER.—Pierre Grandjean, Paris France.
108,703.—SECTIONAL STEAM-GENERATOR.—John Griffith and G. W. Wundram, New York, N. Y.
108,704.—BALANCE SLIDE-VALVE.—Thomas J. Hamer and Martin Walls, Sunbury, Pa.
108,705.—PUMP.—George Hibberd, Wheeling, West Va.
108,706.—SQUARE-SAIL FOR FORE-AND-AFT VESSEL.—Armine A. Holmes, Poultneyville, N. Y.
108,707.—COOLING BUILDINGS.—Theodore Krausch, New York, N. Y.
108,708.—DOOR AND ALARM BELL.—Gasway O. Lackey, Akron, Ohio.
108,709.—DRAWING AND TWISTING-HEAD FOR SPINNING-MACHINE.—Samuel W. Lawrence, Philo Walden, and Joseph W. Huntoon, West Eaton, N. Y.
108,710.—STEAM-ATOMIZER.—Isaac P. Leete, Philadelphia, Pa.
108,711.—VAPOR-BURNER.—Daniel Leonard, Chicago, Ill.
108,712, ante dated October 15, 1870.—COMBINED STALK AND WEED-CUTTER AND LAND-ROLLER.—William Leslie, Fort Madison, Iowa.
108,713.—APPARATUS FOR PREPARING LAKES AND COLORS.—John Lucas, Philadelphia, Pa.
108,714.—STOP-VALVE.—Henry G. Ludlow, Troy, and Jabez Stone, Waterford, N. Y., assignors to Henry G. Ludlow.
108,715.—MACHINE FOR SIZING AND FELTING HAT-BODIES.—G. A. Mandeville, Newark, N. J., assignor to himself and Abram C. Wheaton, same place.
108,716.—HARVESTER.—William Thomas Miller, New Geneva, Pa.
108,717.—CORN-COVERER.—Isaac N. Monroe, Bridgeport, Ill.
108,718.—STEAM-ENGINE.—James Montgomery, New York, N. Y.
108,719.—PEG-BOX FOR PEGGING-MACHINE.—Albert Worthington Moore, East Brimfield, Mass.
108,720.—CARRIAGE-CLIP.—Francis B. Morse, Plantsville, Ct., assignor to himself and H. D. Smith & Co., same place.
108,721.—MACHINE FOR CUTTING AND SMOOTHING THE ENDS OF PENCILS.—Teile M. Muller and Henry C. Benson, New York, N. Y., assignors to Joseph Reckendorfer, New York City.
108,722.—MATERIAL FOR JOURNALS AND BEARINGS.—E. D. Murfey, New York, N. Y., assignor to the Manhattan Packing Manufacturing Company, same place.
108,723.—EARTH-EXCAVATOR.—John W. Myers, Lyons, Iowa.
108,724.—GANG-PLOW.—William Newlin, Attica, Ind.
108,725.—ROSETTE FOR BRIDLE.—James O'Brien, Cedar Rapids, Iowa.
108,726.—FLUE-CLEANER FOR COOKING-STOVES.—H. L. Palmer, Stillwater, N. Y.
108,727.—DRAFT-EQUALIZER.—William M. Perkins and T. F. Vandegift, La Fontain, Ind.
108,728.—PORTABLE PRIVY.—William H. Pulver, Schuylersville, N. Y.
108,729.—BEDSTEAD.—Henry B. Ramsey, Rockville, Ind.
108,730.—PLOW.—George W. Ream, Canton, Ohio.
108,731.—MACHINE FOR BUNDLING WOOD.—John Rushworth, New York, N. Y.
108,732.—REFINING SUGAR BY STEAM.—Francis Schleifer, San Francisco, Cal.
108,733.—HOT-AIR-FURNACE.—Samuel B. Sexton and George W. Beard, Baltimore, Md.
108,734.—CURTAIN FIXTURE.—William E. Scranton, New Haven, Conn.
108,735.—MACHINE FOR MAKING STAPLES.—Jones Curtis Stead, Jersey City, N. J.
108,736.—COOKING-RANGE.—David Stuart and Lewis Bridge, Philadelphia, Pa., assignors to Stuart, Peterson & Co., same place.
108,737, antedated October 15, 1870.—NEEDLE.—Hannah G. Suplee, San Francisco, Cal.
108,738.—WRENCH.—George C. Taft, Worcester, Mass.
108,739.—HARNESS-HOOK.—William H. Taylor, Baldwinsville, N. Y.
108,740.—HANDLE OF TABLE-KNIFE.—John Albert White, Philadelphia, Pa.
108,741.—HORSE-HOE.—John T. Whitlock, Bridport, Vt., administrator of Cyrus Whitlock, deceased.
108,742.—MACHINE FOR MAKING UMBRELLA-CONNECTIONS.—Ed. Wight, Philadelphia, Pa.
108,743.—ELECTRO-MAGNET ALARM-GONG.—Charles Williams, Jr., Somerville, and Jerome Redding, Charlestown, Mass.
108,744.—HORSE HAY-RAKE.—J. E. Wisner, Friendship, N. Y.
108,745.—SPRING FOR VEHICLES.—Henry E. Wolcott, Elbridge, assignor to himself and Russell B. Wheeler, same place, and Ezekiel B. Hoyt, Skaneateles, N. Y.
108,746.—PAPER-FILE.—W. L. Woods, Washington, D. C.
108,747.—WRENCH.—E. J. Worcester, Worcester, Mass.
108,748.—SHINGLING-BRACKET.—E. D. Worcester, Worcester, Mass.

REISSUES.

4,160.—METHOD OF ORNAMENTING TIN, &c.—Louis Fitzmaier, New York, N. Y., assignor to Atwater, Benham & Company.—Patent No. 67,184, dated July 30, 1867.
4,161.—WATER-RESERVOIR FOR COOKING-STOVES.—Chauncey O. Green, Troy, N. Y.—Patent No. 88,160, dated March 23, 1869.
4,162.—Division A.—HOLDER FOR NECK-TIES.—Wm. H. Hart, Jr., Philadelphia, Pa.—Patent No. 76,186, dated March 31, 1868.
4,163.—Division B.—BOX FOR PACKING NECK-TIES.—William H. Hart, Jr., Philadelphia, Pa.—Patent No. 76,186, dated March 31, 1868.
4,164.—CHAIR-SEAT.—Osmore A. Bingham, Ashburnham, Mass. assignor to George C. Winchester.—Patent No. 94,553, dated September 7, 1869; reissue No. 3,890, dated March 22, 1870.
4,165.—Division A.—RESERVOIR FOR WELLS.—R. H. Dewey and Eliphalet N. Tilotson, Chicago, Ill., assignor to Eliphalet N. Tilotson and William E. Tilotson.—Patent No. 53,584, dated April 3, 1866.
4,166.—PRINTING-TELEGRAPH.—Thomas A. Edison, Newark, N. J., assignor by mesne assignments, to the Gold and Stock Telegraph Company.—Patent No. 91,527, dated June 22, 1869.
4,167.—WATER-SUPPLYING APPARATUS.—J. C. Hagan, Nashville, Tenn., assignor of one-half interest to James Walker, Isaiah D. Walker, and Ivan N. Walker.—Patent No. 104,019, dated June 7, 1870.
4,168.—MANUFACTURE OF GAS FROM HYDROCARBONS.—J. Kidd, New York, N. Y.—Patent No. 106,699, dated August 23, 1870; patented in England January 5, 1864.
4,169.—SELF-REGULATING WIND-MILL.—The Continental Wind-Mill Company, New York, N. Y., assignees of Addison P. Brown.—Patent No. 13,156, dated July 3, 1855.

DESIGNS.

4,428.—MATCH-SAFE.—F. W. Brocksieper, New Haven, Conn., assignor to Sargent & Co., same place.
4,429.—KEEPER FOR DOOR LOCKS.—H. H. Elwell, South Norwalk, Conn.
4,430.—FACE-PLATE FOR LOCKS.—H. H. Elwell, South Norwalk, Conn.
4,431.—EACE-PLATE FOR LOCKS.—H. H. Elwell, South Norwalk, Conn.
4,432.—KEEPER FOR DOOR LOCKS.—H. H. Elwell, South Norwalk, Conn.
4,433.—COOKING-STOVE.—W. Hailes, Albany, N. Y.
4,434.—PARLOR-STOVE.—W. Hailes, Albany, N. Y.
4,435.—CARRIAGE-BED.—H. Kilam, New Haven, Conn.
4,436.—HEAD-BAND.—W. S. Mingis, New York, N. Y.
4,437.—TABLE-CASTER.—W. Parkin, Taunton, Mass., assignor to Reed & Barton, same place.
4,438.—CASTER-BOTTLE.—W. Parkin, Taunton, Mass., assignor to Reed & Barton, same place.
4,439.—DRILLING-MACHINE.—F. A. Pratt, Hartford, Conn., assignor to the Pratt & Whitney Company, same place.
4,440.—FRUIT-STAND.—H. Vasseur, Wallingford, Conn., assignor to Simpson, Hall, Miller & Co., same place.
4,441.—TEA-SET.—H. Vasseur, Wallingford, Conn., assignor to Simpson, Hall, Miller & Co., same place.
4,442.—GROUP OF TOOLS, MACHINERY, &c.—E. A. Ellsworth, Washington, D. C.
4,443.—DRESS-TRIMMING.—M. Landenoerger, Philadelphia, Pa.
4,444.—FLOOR OIL-CLOTH PATTERN.—J. Meyer, Kearney, N. J., assignor to John Jewett & Sons, New York City.
4,445.—TOY-CARRIAGE.—F. W. Porter, Springfield, Vt.

TRADE MARKS.

No. 1.—LIQUID-PAINT.—Averill Chemical Paint Company, New York, N. Y.
2.—MUSTARD.—J. B. Baldy & Co, Toledo, Ohio.
3.—RETAIL-COAL.—E. Branson, Philadelphia, Pa.
4.—FISH.—Tracy Coit, New York, N. Y.
5.—OYSTER-PACKING.—W. Lanfair Ellis & Co., Baltimore, Md.
6.—WROUGHT-IRON PIPE.—Evans, Clow, Dalzell & Co., Pittsburg, Pa.
7.—SNUFF.—W. E. Garrett & Sons, Philadelphia, Pa.
8.—CAR-WHEEL.—W. M. Hamilton, New York, N. Y.
9.—SOAP.—John K. Hogg, Frederick, Md.
10.—WOOLEN-HOSE.—A. P. Olzendam, Manchester, N. H.
11.—HAM.—W. Ryan, Dubuque, Iowa.
12.—DRY GOODS.—Dale, Ross & Co., Philadelphia, Pa.
13.—POLISHING-PREPARATION.—The Buffalo Magic Polishing Company, Buffalo, N. Y.
14.—YEAST-POWDER.—H. K. Thurber & Co., New York, N. Y.
15.—WHISKY.—H. K. Thurber & Co., New York, N. Y.
16.—FERTILIZING COMPOUND.—J. J. Turner & Co., Baltimore.

EXTENSIONS.

CYRUS CHAMBERS, Jr., of Philadelphia, Pa.—Letters Patent No. 15,842, dated October 7, 1856; reissue No. 4,079, dated July 26, 1870.
DAVID P. ESTEP, of Pittsburg, Pa.—Letters Patent No. 15,880, dated October 14, 1856.
GEORGE THOMPSON, of Philadelphia, Pa.—Division A.—Letters Patent No. 15,957, dated October 21, 1856; reissue No. 654, dated February 1, 1859; reissue No. 2,569, dated April 16, 1867.
GEORGE THOMPSON, of Philadelphia, Pa.—Division B.—Letters Patent No. 19, 957, dated October 21, 1856 reissue No. 654, dated February 1, 1859; reissue No. 2,570, dated April 16, 1867.
GEORGE THOMPSON, of Philadelphia, Pa.—Division C.—Letters Patent No. 15,951, dated October 21, 1856; reissue No 654, dated February 1, 1859; reissue No. 2,571, dated April 16, 1867.

Beetle Book Borer.—Several species of boring beetles belonging to the family *Plinidæ* destroy books, as well as many other kinds of property, even furniture, clothing, produce, pictures, etc., etc. M. PIEGNOT informs us that one of these penetrated directly through twenty-seven large quarto volumes in so straight a line that he was able to pass a string directly through and suspend the whole series of volumes.—(*Horner's Introd. to Bibliography*, 311.)

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oct25:2t WM. H. TILLINGHAST, Secretary.

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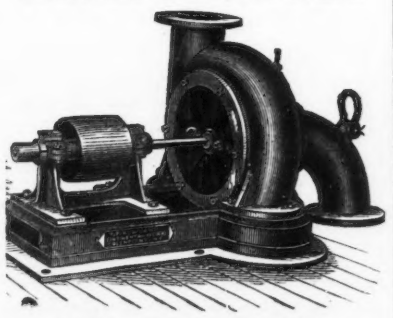

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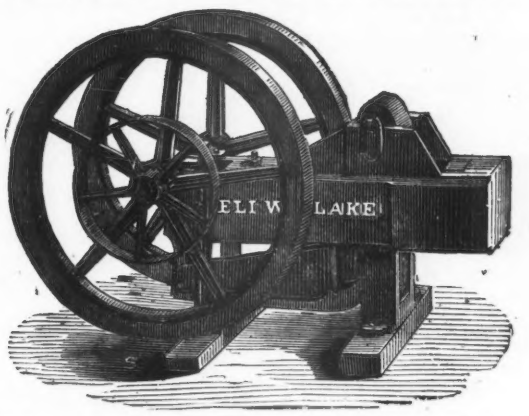

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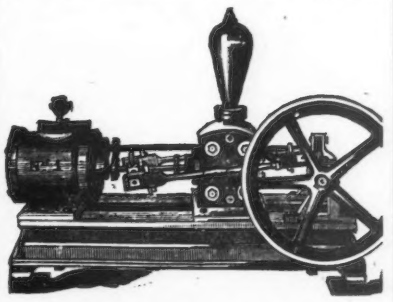

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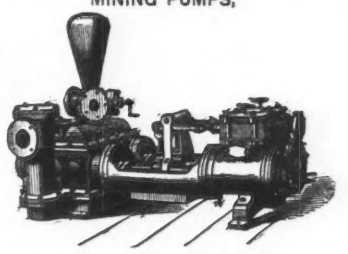

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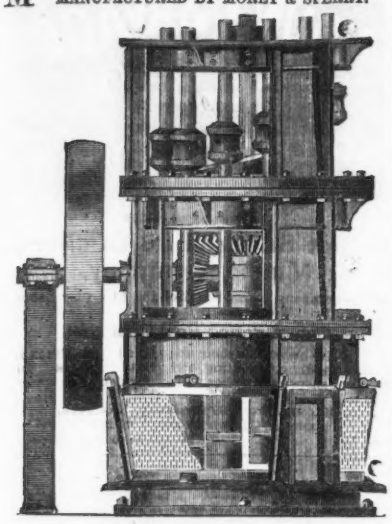

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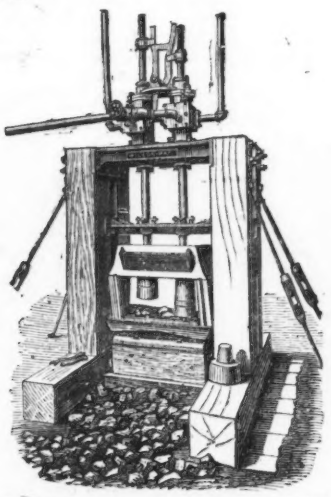

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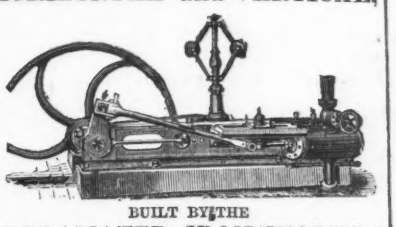

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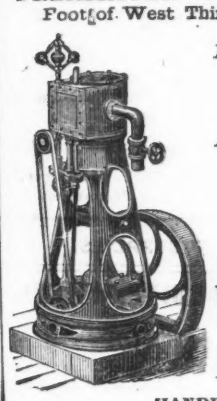

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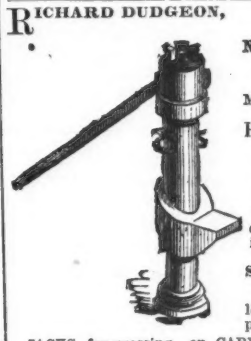

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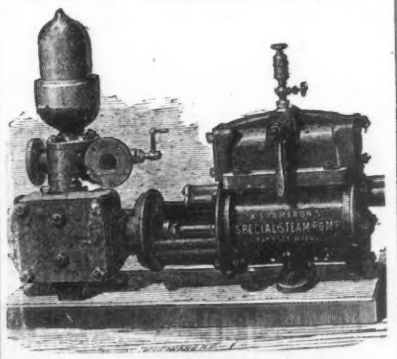

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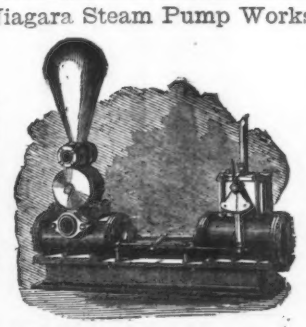

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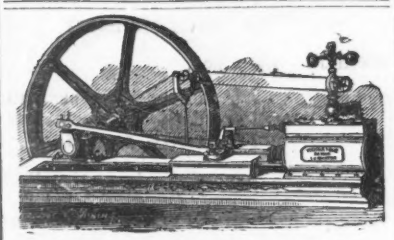

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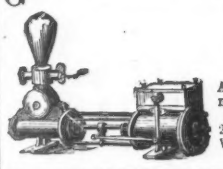

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No. 2. For paving Forty-third street, from Third nue to Fourth avenue with Improved Nicolson ment.

No. 3. For paving Fifty-fifth street, from Eighth a nue to Hudson River (except from Tenth avenue Hudson River), with Belgian pavement.

No. 4. For paving Thirty-first street, from Seco avenue to East River, with Belgian pavement.

No. 5. For paving Varick street, from Franklin stree to Carmine street, with Belgian pavement.

No. 6. For paving Seventy-seventh street, from Mad son avenue to Fifth avenue, with Belgian pavement.

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No. 8. For paving Pearl street, from Whitehall street to Coenties Slip, with Belgian pavement.

No. 9. For paving Broome street, from the Bowery to Norfolk street, with Belgian pavement.

No. 10. For paving Madison avenue, between Forty-second and Eighty-sixth streets (excepting between Forty-second and Sixty-eighth streets and Seventy-fourth and Eighty-sixth streets), with Belgian pavement.

No. 11. For sewer in First avenue, between One Hundred and Twenty-first and One Hundred and Twenty-fourth streets.

No. 12. For sewer in Fourth avenue, between One Hundred and Twenty-fifth and One Hundred and Thirty-second streets, with branches.

No. 13. For sewer in Avenue A, between Seventy-ninth and Eighty-sixth streets, with branches,

No. 14. For sewer in Laurens street, between Broome and Spring streets, and basins in Laurens street, between Canal and Fourth streets.

No. 15. For sewer in Chrystie street, between Delancy and Rivington streets.

No. 16. For sewer in Forty-fourth street, between Second and Third avenues.

No. 17. For sewer in One Hundred and Thirteenth street, between Third avenue and Harlem River.

No. 18. For regulating, grading, curb and gutter, and flagging Madison avenue (Section 1), between Eighty-Sixth and Ninety-ninth streets.

No. 19. For regulating, grading, curb and gutter, and flagging Madison avenue (Section 2), between Ninety-ninth and One Hundred and Fifth streets.

No. 20. For regulating, grading, curb and gutter, and flagging Madison avenue (Section 3), between One Hundred and Fifth and One Hundred and Twentieth streets.

No. 21. For regulating, grading, curb and gutter, and flagging Eighth avenue (Section 3), between One Hundredth and One Hundred and Fwenty-second streets.

No. 22. For regulating, grading, curb and gutter, and flagging Seventy-third street, between Eighth avenue and Hudson River.

No. 23. For curb, gutter and flagging Eighty-sixth street, between First avenue and East River.

No. 24. For curb, gutter, etc., South street, between Jackson and Corlaers streets, and Corlaers street, from South street to Water street.

Blank forms of proposals, the specifications and agreements, the proper envelopes in which to enclose the bids, and any further information desired, can be had on application to the Contract Clerk at this office.

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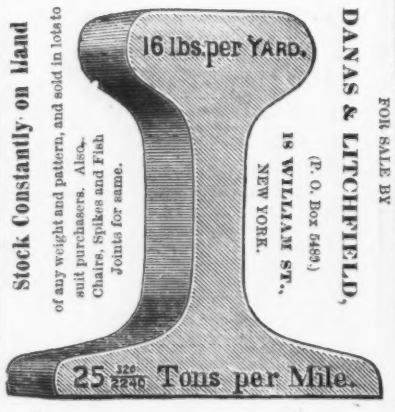
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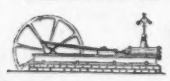

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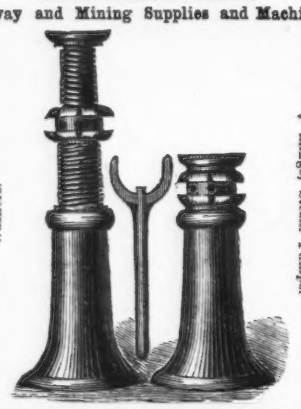

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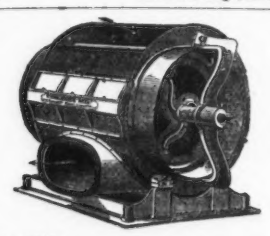

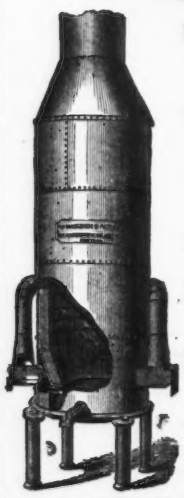

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